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SEPTEMBER 12, 1955

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The new system is shown prominently here. The outmoded electron-tube model (two components) is phantomed in behind. With the use of transistors has come:

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Combining new miniaturization techniques with years of experience in producing precise, reliable controls, the new Honeywell system will give accurate indication for a minimum of 1,000 hours of operation without recalibration.

In safeguarding engine life and assuring the pilot of adequate thrust, accurate temperature indication is a must. That's why this new system should contribute to more efficient and reliable jet flight.

For additional information of this new exhaust temperature indicating system write to the address below, Dept. AV-9-144.

MINNEAPOLIS **Honeywell**

Aeronautical Division

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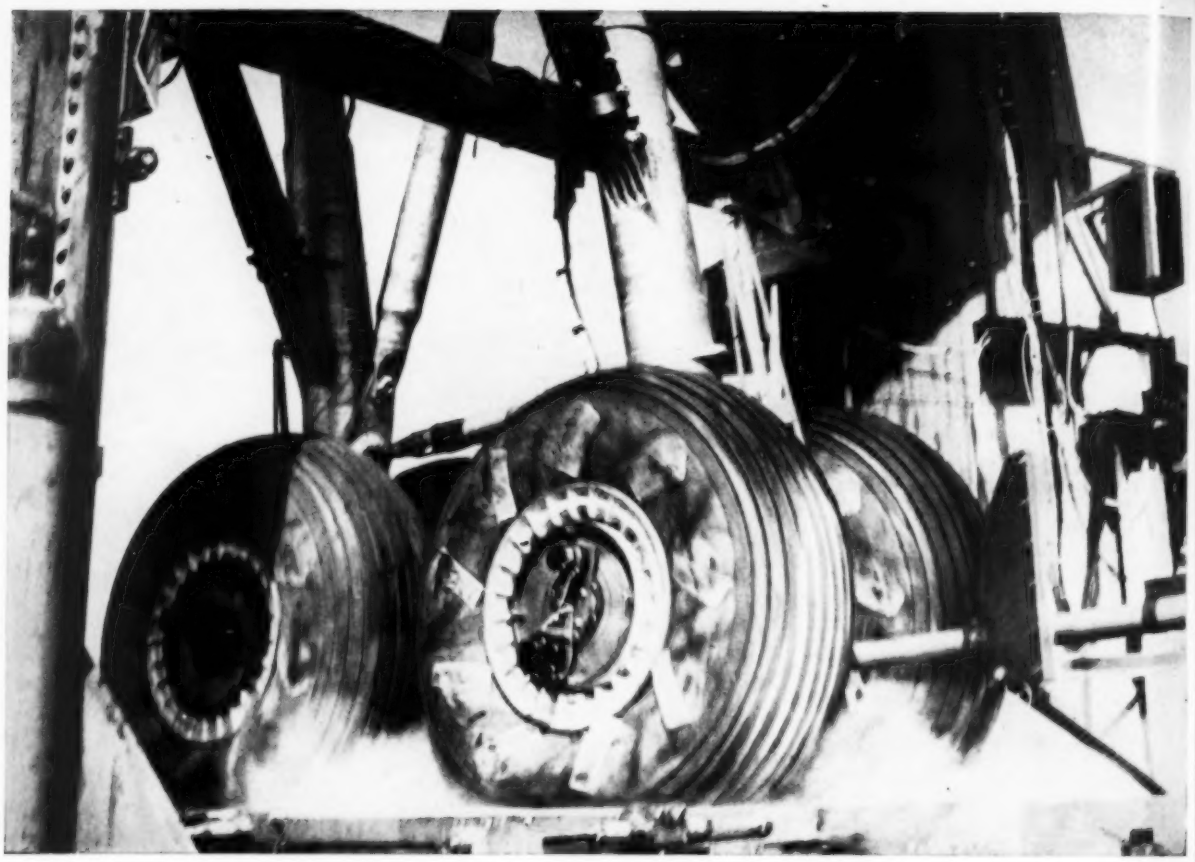
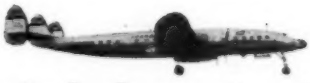


On *TWA's* **SUPER-G** Lockheed Constellation's landing gear . . .



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The Lockheed experiments are directed toward development of lighter, stronger landing gear. These new units in turn demand fasteners designed for maximum resistance to fatigue failure plus the utmost dependability in terms of rated tensile performance and resistance to loosening under severe vibration and extreme shock and impact loads. Among the planes to benefit from data already secured by these punishing tests is the new Lockheed Super G Constellation, already placed in service by TWA. The Super G Connie's landing gear is only one of the many structural sections of the new plane fastened with vibration-proof Elastic Stop nuts.

Elastic Stop nuts with their familiar red locking collars have been used on every new air frame developed during the last two decades. They have performed satisfactorily under the most unpredictable test conditions . . . under normal operating conditions . . . and throughout millions of hours of rugged combat service. You can rely on flight-tested Elastic Stop nuts!

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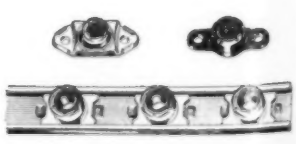

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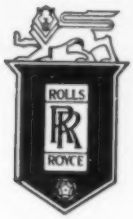

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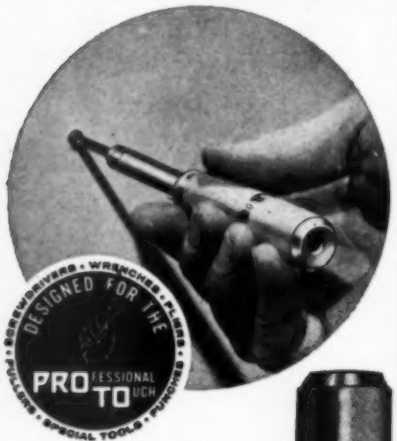

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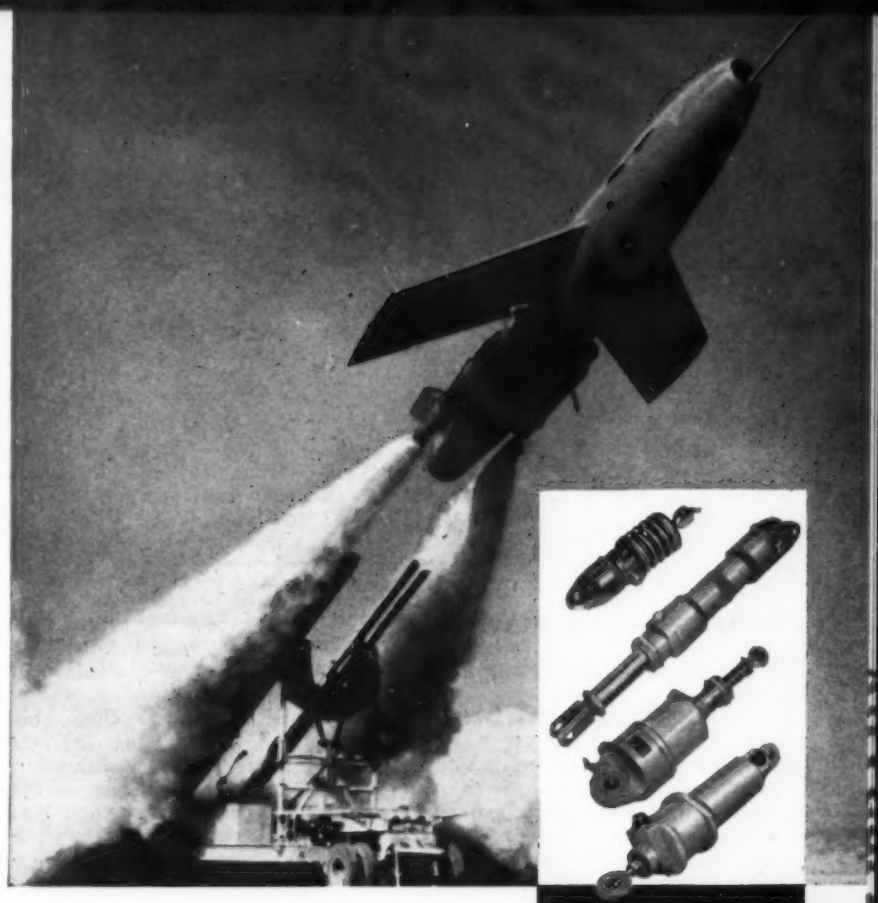

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Industry News Digest

F-100 Sets Supersonic Speed Mark

Air Force officially announced at the National Air Show at Philadelphia last week that a North American F-100C had set a supersonic level flight speed of 822.135 mph August 20 over the Mojave Desert. Col. Horace A. Hanes, Air Research and Development Command test pilot, was awarded the Thompson Trophy for the feat.

It marked the first time that: an official level-flight top speed has exceeded Mach 1; the Thompson Trophy winner was other than a closed course participant; a record run was made at high altitude, now possible because of new equipment to clock speeds.

Col. Carlos M. Talbott won the Bendix Trophy in an F-100C with an average cross-country speed of 610.726 mph, under last year's 616 mph mark.

General Electric trophy went to a Boeing B-47 crew from the 443rd Squadron of the 320th Bombardment Wing, March AFB, Calif. Average cross-country speed was 589.294 mph. Three B-47s participated.

Examiner Recommends New Air Service to Southwestern States

CAB Examiner William J. Madden recommended late last month that American, Capital, Eastern, and TWA be authorized to operate new routes between the Texas/Oklahoma/Louisiana area and major northeast cities.

In his report in the Northeast-Southwest Service Case, Madden suggested these routes:

• **American**—new segment between Houston, Nashville, and New York/-Newark with one leg from Nashville via Louisville, Cincinnati, Pittsburgh, and Philadelphia and another via Knoxville, Bristol, Roanoke, Lynchburg, Richmond, Washington, Baltimore, Wilmington, and Philadelphia.

• **Capital**—(a) extension of Route 55 beyond Atlanta to Birmingham, Mobile, and New Orleans; (b) extension of Route 51 beyond Asheville to Atlanta, Birmingham, Mobile, and New Orleans and northward beyond Washington to Baltimore, Philadelphia, and New York/Newark.

• **Eastern**—new segment between Fort Worth/Dallas and New York/-Newark via Memphis and Nashville with one leg beyond Nashville via Pittsburgh and Philadelphia, and another via Washington, Baltimore, and Philadelphia.

• **TWA**—add Tulsa and Oklahoma as new intermediates between St. Louis and Amarillo on Route 2; also extend route from Washington to New York via Baltimore and Philadelphia.

Madden recommended that the route awards be conditioned so that service will be provided only through flights between the Northeast and Southwest or between so-called "midway points" and cities either in the Northeast or Southwest.

Four B-57s Ferried To FEAF in Japan

Four twin-jet Martin B-57As were ferried to Japan last month in the first flight delivery of the Canberra-type light bombers across the Pacific.

Military Air Transport Service supervised the operation. Planes flew from Hamilton AFB, Calif., via Hickam Field, Honolulu, to the Far East Air Forces in Japan.

NAL Seeks Court Aid In Merger Proposal

National Airlines went to court last month to force its bid for "equal treatment" by the Civil Aeronautics Board in connection with a possible merger with Colonial Airlines.

NAL asked the Court to stay further procedural steps in the current Eastern-Colonial Merger Case and to order CAB to consider in that case issues which it previously excluded. Among such issues, NAL said, are the merits of a National-Colonial merger, Eastern's record of "past violations" in merger dealings with Colonial, and

BOEING'S EXPERIMENTAL XB-47D, with two Wright T49 turboprops replacing the paired inboard General Electric J47s, made its first flight late last month. The XB-47D is being used as a flying testbed for the T49, described as the most powerful engine ever to turn a propeller in actual flight. The turboprops, turning Curtiss Turbolectric props, are augmented by the two outboard J47 turbojets.

CANBERRA SPROUTS RADAR NOSE. This English Electric Canberra B8 was converted by Boulton Paul Ltd. as an all-weather fighter radar testbed. Nose shape is similar to that of the Gloster Javelin.

NAL's proposed route extension to Montreal.

CAB hearings have been completed in the Eastern-Colonial case and briefs were due to be filed last week. The proceeding was streamlined by CAB orders which limited issues to terms of the merger agreement and possible conditions which should be attached to any CAB approval.

In pleadings before the U.S. Court of Appeals in Washington, National said it would be "irreparably injured" if the CAB case isn't stayed. National cited numerous CAB "errors" which, it said, "constitute a prejudgment in favor of the Eastern-Colonial merger since ignoring the problems raised in the issues so eliminated automatically removes the principal obstacles to approval."

MATS Gets First C-121C

Military Air Transport Service this month is phasing in the first of its fleet of 33 Lockheed C-121C Super Constellations in transatlantic operations. The 75-passenger C-121C, powered by Wright Turbo Compound engines, can be converted in four hours either to a cargo carrier or flying hospital. First plane is assigned to the 1608th Air Transport Wing, Charleston, S. C.

Solar Sells Know-How To British Air Firm

Solar Aircraft Co. of San Diego and Bristol Aeroplane Co. Ltd. have signed a contract whereby the California firm will supply afterburner knowledge and know-how to the British aircraft company. Solar has been specializing in afterburner design, development and production since the end of World War II.

Solar will begin immediate development of prototype afterburners for Bristol engines, probably including the 11,000-lbs.-thrust Olympus.

BOAC Reports Profit Despite Comet Loss

British Overseas Airways Corp. showed a net profit of $732,723 for the fiscal year ended March 31, despite loss of Comet service, the company reports. The profit compares with a net of $2,983,111 for the previous year.

BOAC reports a direct capital loss of $4.8 million on the Comet equipment, in addition to resulting revenue loss. Company says it suffered an additional loss of $1.1 million on disposal of its Hermes transports.

Tourist bookings accounted for 45.2% of the company's traffic, compared with 32.5% the previous year.

M-100 Jet Trainer Readied for Winter

F. G. Miles, Ltd., has half completed its M-100 Student primary jet trainer prototype and figures to have the aircraft ready this winter, with the test program to begin in the spring. The M-100 is designed as a side-by-side dual control trainer, but four-seat liaison and AOP (larger wing) versions are contemplated. The high wing is a feature of the airplane with NACA flush intake in the cabin roof. Either single or twin jets (Blackburn & General's Marbore or two Palas 600s) can be mounted over the wing in the fuselage top.

Principal data: span, 28 feet: length 27 feet; height, 6 feet 3 inches; wing area, 140 square feet; gross weight (trainer) 3,100 pounds, (liaison) 3,600 pounds. Estimated performance with Marbore 2: takeoff to 50 feet, 1,650 feet initial climb, 2,440 fpm; time to 20,000 feet, 11.3 minutes; maximum speed, sea level, 295 mph; cruise at 20,000 feet, 268 mph; still-air range, 465 miles; maximum duration, three hours five minutes; powered with two Palas 600s —takeoff to 50 feet, 1,875 feet; initial climb, 2050 fpm; time to 20,000 feet, 16.8 minutes; still-air range, 400 miles; maximum duration, two hours 40 minutes. Design dive speed is 460 mph.

Princess Performance Estimates Issued

Saunders-Roe, Ltd., has issued performance estimates for the Princess flying boats with six Bristol BE-25 5046-ehp turboprops. Engines would be installed in partly submerged wing nacelles and would drive de Havilland reversible propellers, 16½ feet in diameter. Total fuel capacity remains at 17,400 gallons, but takeoff gross is upped from 315,000 to 345,000 pounds. The aircraft will be capable of flying England-New York nonstop against 92-mile headwinds.

Estimated cruise speed at mean operating height of 32,000 feet is 358 mph. Takeoff (ISA conditions, no wind) at 345,000 pounds is, unstick, 6720 feet, distance to clear 50 feet, 8340 feet; initial climb, 1000 fpm.

Harry Rowland Dies

Harry T. Rowland, 56, president of Hayes Aircraft Corp. of Birmingham, Ala., and former executive vice president of the Glenn L. Martin Co., died August 28.

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Letters

Airline Business Fleets

To the Editor:

On what basis does the Civil Aeronautics Board allow a subsidy-supported airline to enter into competition with unsubsidized small, private, fixed base operators?

Capital and National Airlines are now in the business of leasing aircraft to corporations, and of running their executive operations for them, furnishing crews, maintenance, financing and other associated services. Pan American, Piedmont, Eastern and other airlines now install equipment, overhaul engines, instruments and radio, sell fuel, perform maintenance, inspections, engineering, modifications, conversions or other services for business-operated aircraft, although there is little economic or practical similarity between airlines and executive operations.

Many fixed business operators receive their entire unsubsidized livelihood from furnishing these services to this new segment of aviation that they built themselves. Now that it appears profitable, the airlines, with the comfortable backing of their subsidies, are moving to cash in on a market whose development they once opposed. Similarly, the nonskeds displayed enough imagination to initiate coach, tourist and other much-needed public services in the face of airline opposition, only to have the airlines take it over (when it showed profit) under cover of heavy CAB paperwork pressure.

We ourselves held a letter of Registration as a large irregular air carrier for several years and used it solely to furnish standby aircraft for companies whose own planes were down for maintenance, or as auxiliary aircraft for customers whose planes were too small for some particular purpose. We voluntarily withdrew it because our use of it did not justify the required amount of time, paperwork and quibbling over commas, methods of printing tariffs, whether reports or tariffs could or could not legally arrive at the CAB on a legal holiday, etc., ad infinitum. We have a voluminous file of correspondence with the CAB which makes pretty hilarious reading, now that it's in retrospect and since we don't make our living at it.

Also, our Letter wasn't worth the establishment of an entire department for the sole function of following the hyper-legalistic maneuverings and oppositions of airlines with whom we did not compete by any stretch of imagination. If we used our Letter, we competed with the airlines and they opposed us. If we didn't use it enough, there was no "necessity in the public interest," and they opposed us anyway.

We had no interest in the creation of a whole new profession of airlines—CAB liaison interpreters, lawyers and consultants, and preferred to turn our energies and investment to the development of private business aviation, trusting that the airlines would be satisfied with their subsidies, guarantees of economic welfare, and their CAB protection from nonskeds, irregulars, low-cost flights, tourist fares, coaches and other naughty words. As a result, we can take pride in the fact that we have added over 100 executive DC-3s to the American business aircraft fleet.

However, it seems that business aviation has now grown big enough, thanks to the efforts of fixed base operators, to attract brokers, opportunists and the airlines, since, like the air-coach, somebody else has furnished the idea, initiative, investment and trouble to pioneer.

This will be an excellent chance for the CAB to demonstrate whether it is interested more in development of aviation, as originally intended in its founding, or in development of airline "economic security," as it has acted.

Will it now impartially protect the "economic welfare" of the rest of aviation against the competition of airlines as assiduously as it has protected the welfare of the airlines against the rest of aviation?

W. F. REMMERT
President
Remmert, Werner, Inc.
Lambert Field
St. Louis 21, Mo.

RAS Meeting

To the Editor:

The June 20th issue of AMERICAN AVIATION has been received and I wish to express my sincere thanks for the excellent job you did in covering Reading Aviation's sixth annual Maintenance and Operations Meeting.

Please extend the thanks of everyone at Reading Aviation Service for the generous space devoted to our meeting.

Charles J. Melville
Director of Advertising
and Public Relations
Reading Aviation Service, Inc.
Reading, Pa.

Swissair's Story

I have just received the August 15 copy of AMERICAN AVIATION and I want to thank you for having given our company such a prominent place in your magazine. I must congratulate you for having brought in this article the most important part of the problems of Swissair in a very clear way understandable to anybody.

M. P. VIRCHAUX
Public Relations Officer
Swissair
Zurich, Switzerland

Books

Le Droit Aerien *By R. Saint-Alary. Published by Librairie Armand Colin, 103 Boulevard Saint-Michel, Paris. 250 Fr. (71¢). 215 pp.*

For students of air law conversant with the French language this book contains a useful and up-to-date account of the legal problems connected with the operation of aircraft. The author outlines solutions to these problems under French law and under international conventions and agreements. Useful references are made to the relationships between operators and governments. . . . AV.

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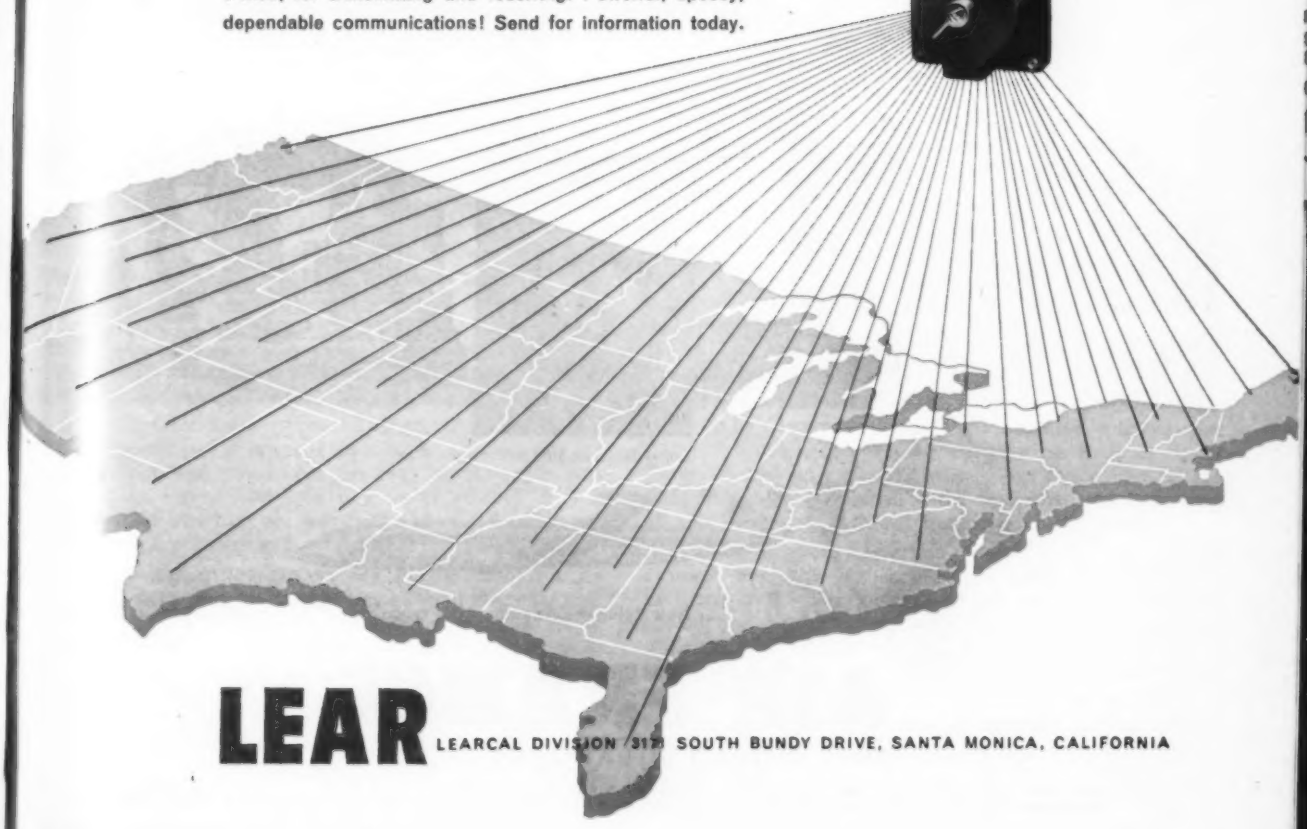

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WHAT DO YOU KNOW ABOUT AVIATION...

Who Made the First Powered Vertical Flight?

One of the small band of pioneers who began to experiment with heavier-than-air flight at the turn of the century, this man made the first powered vertical flight in 1907. In 1911, he set a world's distance record of six miles. He founded a famous aviation company whose planes saw service in both world wars. One of them made the first East-West flight from Paris to New York. His bust is in the American Aviation Hall of Fame in Washington, D. C. His name, *Louis Breguet.*

In 1919 Monsieur Breguet founded France's first airline, which later became Air France. It was he who set the standards of dependability and technical efficiency that have made it possible for Air France to serve the peoples of 76 countries for 36 years.

Louis Breguet just before his death at the age of 75 in 1955.

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Personal View

By WAYNE W. PARRISH

The Aircraft Industry and the Future

IT IS only natural that top managements in the aircraft industry should be posing some questions about the future these days.

Will the current international atmosphere of sweetness and cordiality soften up the nation's defense program as time goes on? If the major platform in the 1956 presidential campaign is based on peace, will the same old cries for cutting defense budgets take over the microphones again? And will the defense industries be the fall guys for a block-busting effort to present a balanced budget to the taxpayers to carry out campaign pledges of the last election?

At the moment one can be optimistic. The last session of Congress showed not the slightest wavering on defense matters. In fact only a few months ago important elements of Congress were berating the Air Force for not moving ahead fast enough. The carryover funds are reasonably comfortable. It is not the immediate outlook which is cause for caution, but the outlook for the 1956 election campaign and beyond.

'Famine' Recalled

Those in industry with long memories have no difficulty recalling the acute famine of 1945-50 during that period of cheerful delusion when even the most basic and pressing research and development requirements were suspended.

They also remember that the nation's defense establishment thrives and wilts in a political climate, both domestic and international. For the past five years—for the first time in non-war history—this country has been solidly realistic to defense needs and the need for continued development of superior weapons. But political climates do change under the pressures of taxes, demagoguery, and relaxed tensions.

Certainly the Geneva Conference in July did not result in assurances of peace, nor have any responsible leaders drawn such a conclusion. But the Geneva four-power meetings did have one significant result which should not be overlooked for the long pull. This result is the dissipation of the fear of a surprise attack and the relaxing of those tensions which had been building up toward a possible war of survival between two major powers. It was those tensions based on the possibility of an all-out showdown which kept defense appropriations at a high level.

Now the major powers are in the talking stage again and there is a lot of discussion about disarmament, that will-o-the-wisp intangible which has cropped up many times before with no practical results. Perhaps a workable formula will be found this time, but until it *is* found there is always the danger that talking about disarmament means a relaxing of the drive for superior equipment and a slowing down of research and development.

There is no possible doubt that Soviet Russia has changed, but whether the change is tactical or strategic can only be determined by time. If the change is fundamental, i. e., the abandonment of ideological world conquest, then much more evidence is required than a series of conferences. But in Europe the Russian moves have had a solid effect in intensifying the wave of neutralism which began with the death of Stalin and picked up strongly when the French defeated ECA early last year. The U.S. placed its money on ECA as a maximum European defense effort, and lost. The U. S. also lost at the same time the great power it had exerted over Western Europe since 1945. Europe is giving only token lip-service to a genuine defense program.

In the final analysis the real test of Russia's future intentions will be found in its continuation or abandonment of its Cominform, by whatever name, as an instrument of unrest, infiltration, subversion, fomenting of strikes and other troubles, in every country of the world, under direct orders from Moscow. There can be no co-existence and there can be no proof that the Soviets have abandoned their drive for world ideological conquest, until positive steps have been taken to break the direct ties of Moscow with the worldwide network of Communist Party workers, tools, stooges and dupes.

So it is that the current international atmosphere is worth watching closely from the standpoint of the aircraft industry. There is a direct line between the international climate and the industry through a trunk switchboard called Congress.

It is idle to presume that just because the tensions of a world war are broken that the globe is in for real peace. Asia is and will likely remain a trouble area for decades. There are many rumblings in Africa and the French are far from solving their problems in the northern part of that continent.

Long-Range Problem

The problem in the U.S. which must be faced before long is that once the defense goals established at the height of the cold war are completed toward the end of 1957, the drive must continue for research and development and replacement of existing equipment with superior weapons systems. The very evident progress made by Soviet Russia should be sufficient to keep up the tempo in the U.S., but we have relaxed in the past when the facts were all too clear and were not heeded.

No thinking American wants war if it can be avoided, nor does he want a high defense budget if it isn't necessary. The current international atmosphere of cordiality is a great relief. But a vast amount of proof and evidence is needed before any relaxation in the U.S. can be afforded. It could be the costliest mistake any nation ever made. It is to be fervently hoped that the emotions of peace in the 1956 national election campaign will not delude anyone to favor relaxing until—and if—there is proof positive that such relaxing is justified. And that proof won't come rapidly or easy.

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Production Spotlight

• Navy is planning to use more powerful engines than the four Allison J71s plus afterburners to make the production model of the Martin Seamaster supersonic. XP6M-1 with the J71s will attain Mach .95.

• Nuclear reactor soon will be flying in a modified B-36 at Convair-Ft. Worth. Installation will not be used to power the bomber, but is designed simply to provide more data on nuclear propulsion.

• USAF has awarded Phase I contracts to Fairchild and Convair calling for evolution of a new pilotless aircraft.

• Avco Manufacturing Corp. now is in the Atlas intercontinental bombardment missile picture as a second source for development of an integral part.

• Air Force may add auxiliary jets—Fairchild J44s or Continental J69s—to some of its Convair T-29s for use by students at the new Air Academy at Colorado Springs. Better performance in the thin Colorado air is required for Convairs.

• The Fokker F-27 Friendship program is lagging badly. Latest word is that the high-wing transport, to be powered by a pair of Rolls-Royce Dart turboprops, will not fly until early next year.

• U. S. financial support of the Bristol Orpheus turbojet involves payment of 75% of the development costs up to a maximum of $3.5 million. U. S. gets full authority to appoint licensees, but manufacturing royalties will be paid to Bristol.

• Rolls-Royce is building a second VTOL thrust-measuring rig. It will be a modified version of the original Flying Bedstead.

• Ryan Aeronautical Co. is in quantity production of its Q-2A Firebee target drone. Air Force compliance inspection was made last month.

• Curtiss-Wright Corp. Electronics Division has received flight simulator orders from Air France and KLM. Former wants a simulator for the Super Constellation, the latter for a DC-7C. Both are scheduled for delivery by mid-1956.

• SNCASE's Caravelle twin-jet airliner, which has logged 53 hours, reached an altitude of 42,500 feet and took off on one jet in 4,495 feet during second phase tests. Third phase test, including altitude, optimum climb speed, deicing, pressurization etc., is under way. Price tag of Caravelle is estimated at $1.6 million. Company hopes to produce 40 to 50.

• Douglas and Boeing apparently have the U.S. jet transport market to themselves. Lockheed presently is wrapped up in the turboprop Electra and Convair has just about abandoned plans for a jet-powered airliner. Martin, however, still has some hopes for a commercial jet flying boat based on the XP6M.

• Two Spanish aircraft companies, Construcciones Aeronauticas S.A. (CASA) and Aeronautica Industrial S.A. (AISA), are reported planning to merge. CASA is Spain's largest aircraft firm, building transports and bombers, and AISA specializes in personal aircraft and sailplanes.

HANDLEY-PAGE HERALD made its first flight August 25. Company now calls the 44-place "DC-3 replacement" a "branchliner." Herald is powered by four Alvis Leonides Major engines. Plane in background is Handley-Page Victor four-jet bomber.

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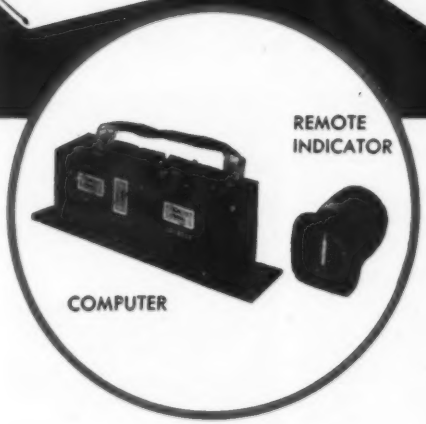

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Pan American Strato-Clipper unloads at Honolulu, Hawaii. General Electric engineered electric system on this and other Pan American Clipper planes plays important part in passenger comfort, and confidence in service.

HOW PAN AMERICAN IMPROVES AIRCRAFT

Located in nose of Strato-Clipper, G-E protective panel helps assure electric system reliability.

Arrangement of G-E circuit breakers shows high accessibility—an important part of Pan American's program for easier maintenance of electric systems.

At Pan American's service shops, G-E field engineers assist in helping to improve reliability of electric components.

Long life of G-E aircraft generators has been attained through improved brush riggings and bearings.

The new Douglas Super 7 Clipper makes maiden voyage for Pan American's 50,000th trans-Atlantic crossing, representing 150 million miles of flight. Airline's success with G-E electric systems led to Pan American specifying G.E. for new fleet of "Super-7's."

ELECTRIC SYSTEM RELIABILITY

G-E design engineering combined with first class field service help Pan American increase life of power generating systems.

Dependability of Pan American World Airways' aircraft generating systems is the result of a continuous co-operative effort between General Electric and the airline to increase the life and reliable operation of the G-E components which help make up the system.

This reliability is essential. Pan American's flights travel over jungle, desert, ocean, and rugged mountain terrain in all parts of the world. Any trouble encountered in the plane's electric system could mean time-consuming delays at remote air fields. These could be costly to the airline *and* passengers.

G.E. develops protective system

To meet such problems before they occurred, Pan American called in General Electric to work closely with them and the airframe manufacturers. Conferences were held, and G-E application engineers designed and demonstrated a generator protective system which fulfilled all the requirements. So successful was this system that adaptations were installed on Pan American's new DC-6B's and DC-7B's aircraft.

At the same time these engineering strides were being made, G.E. carried on a continuous field service to assist Pan American's overhaul shops in improving the component performance of the systems. This field service assistance with the airline is still operating today. The result—the G-E electric system has given Pan American the increased safety protection its service demands, as well as better operating performance. That's why they are specifying G-E generator systems on new aircraft purchases.

Service available to you

G-E application and field service engineers can help solve your electric system requirements regardless of where you are located. For further information, contact your G-E Aircraft Specialist through your nearest G-E Apparatus Sales representative today. General Electric Company, Schenectady 5, N. Y. 210-96

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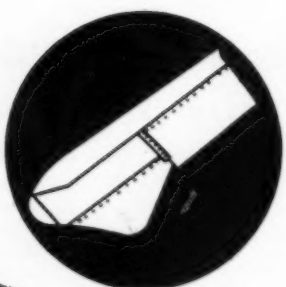

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When & Where

Sept. 16—Airwork engine forum, sponsored by Pratt & Whitney and Bendix, Miami, Fla.

Sept. 19-21—American Rocket Society fall meeting, Los Angeles.

Sept. 21—Southwest Airmotive engine forum, sponsored by Pratt & Whitney and Bendix, Dallas, Tex.

Sept. 21-22—American Helicopter Society second annual western forum, Los Angeles.

Sept. 25-27—International Northwest Aviation Council's 19th annual conference, Chinook Hotel, Yakima, Wash.

Sept. 26-27—Automation Symposium, sponsored by R.E.T.M.A., Univ. of Pennsylvania, Philadelphia.

Sept. 26-Oct. 8—USAF second annual all-jet Fighter Weapons & Gunnery Meet, Yuma AFB, Ariz. and Nellis AFB, Nev.

Sept. 26-30—Air Transport Association meteorology committee meeting, Bent Creek Ranch, Asheville, N. C.

Sept. 27—N. Y. State annual airport development & operations conference, Syracuse.

Sept. 28-29—Industrial electronic conference sponsored by AIEE and IRE, Detroit.

Sept. 28-29—Industrial Electronics Conference, sponsored by A.I.E.E. and I.R.E., Park Sheraton Hotel, Detroit, Mich.

Sept. 29-30—Radio Technical Commission for Aeronautics, Fall Assembly, Hotel Statler, Washington, D. C.

Oct. 1—Symposium on small gas turbines, sponsored by American Society of Mechanical Engineers and Brooklyn Polytechnic Institute, New York City.

Oct. 3-5—Eleventh annual National Electronics Conference, Hotel Sherman, Chicago, Ill.

Oct. 4-6—Eleventh annual spark plug & ignition conference, sponsored by Champion Spark Plug Co., Toledo, O.

Oct. 5-7—National Airports Conference (sponsored by American Association of Airport Executives and the University of Oklahoma, Norman, Okla.

Oct. 5-7—National Business Aircraft Association annual meeting & forum, Detroit.

Oct. 5-9—Plastic Fair & Trade Exposition (featuring a number of aviation exhibits), National Guard Armory, Los Angeles.

Oct. 7—Symposium of "Escape from High Performance Aircraft" under auspices of Aero-Medical Engineers Association, Los Angeles.

Oct. 8-14—Ninth annual All-Texas Air Tour.

Oct. 11-13—Air Transport Association engineering & maintenance conference, Dallas, Tex.

Oct. 11-15—National Association of State Aviation Officials annual meeting, Dallas, Tex.

Oct. 11-15—Society of Automotive Engineers aeronautic meeting, aircraft engineering forum & aircraft production forum, Los Angeles.

Oct. 25-27—American Institute of Electrical Engineers conference on aircraft electrical applications, Los Angeles.

Oct. 26—University Aviation Association annual meeting, Cleveland.

Oct. 26-28—National Aeronautic Association annual meeting, Cleveland.

Oct. 26-28—Southeastern Airport Managers' Association annual meeting, Greenville, S. C.

Oct. 27-28—Aircraft Electrical Society's twelfth annual display of aircraft electrical equipment, Los Angeles.

Oct. 31-Nov. 1—East Coast Conference on Aeronautical and Navigational Electronics, sponsored by I.R.E., Baltimore, Md.

Nov. 7-9—Eastern Joint Computer Conference (IRE-AIEE-ACM), Hotel Statler, Boston.

Nov. 28-30—Instrumentation Conference and Exhibit, sponsored by I.R.E., Atlanta Biltmore Hotel, Atlanta, Georgia.

INTERNATIONAL

Sept. 19—IATA traffic advisory committee meeting, Miami, Fla.

Sept. 20—IATA annual traffic conference, Miami, Fla.

Oct. 10—IATA legal committee meeting, Nassau.

Oct. 11-12—Franco - Italian aeronautical meeting, Paris.

Oct. 13—IATA executive committee meeting, New York City.

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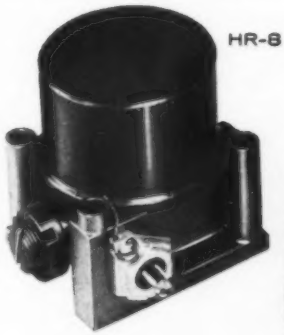

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HR-9

SPECIFICATIONS	HR-8	HR-9
RATED FLOW:	2.8 G.P.M. at 1300 P.S.I. Press. Drop and 6 MAAI	4 G.P.M. at 1500 P.S.I. Press. Drop at 3 MAAI
GAIN:	.46 G.P.M. Per MAAI	.5 G.P.M. Per MAAI
OPERATING CURRENT:	4 MA Quiescent	4 MA Quiescent
OPERATING PRESSURE:	1500 P.S.I.	3000 P.S.I.
LEAKAGE:	.15 G.P.M. Max. (None External)	.15 G.P.M. Max. (None External)
NATURAL FREQUENCY:	250 CPS	250 CPS
DITHER:	None	None
COIL:	Concentric Double Wound.	Double Wound. Equal Resistance Windings

HR-10

HR-11

SPECIFICATIONS	HR-10	HR-11
RATED FLOW:	4 G.P.M. at 3000 P.S.I. Press. Drop and 8 MAAI	.4 G.P.M. at 3000 P.S.I. Press. Drop and 20 MAAI
GAIN:	.05 G.P.M. Per MAAI	.02 G.P.M. Per MAAI
OPERATING CURRENT:	4 MA Quiescent	10 MA Quiescent
OPERATING PRESSURE:	3000 P.S.I.	3000 P.S.I.
LEAKAGE:	.10 G.P.M. Max. (None External)	.10 G.P.M. Max. (None External)
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ELIMINATION OF THE PEAKS AND VALLEYS which have plagued the aircraft and electronics industries in the past should come into new emphasis under Air Secretary Donald A. Quarles. In one of his first public speeches, Quarles recently went on record in favor of a steady program which would enable the two industries "to provide the equipment we need on an orderly basis without costly crash expansions or sharp cutbacks." If Congress supplies the funds, Quarles said, "we propose to pursue this program vigorously and with full utilization of the most modern technology."

AIRLIFTING OF MOST OF THE ARMY'S combat organizations and their equipment can be "a great economy" in the opinion of Gen. Maxwell D. Taylor, Army Chief of Staff. Pointing out that air transportation is vital not only for the airborne division but for infantry divisions as well, Taylor says, "if we can air-transport a regiment, we can air-transport a division—provided we plan realistically now."

Resulting advantage, he points out, is that strategic air mobility multiplies the effectiveness of the Army's central reserve (in the U.S.) and reduces the number of troops which must be kept abroad.

DEFENSE SECRETARY CHARLES E. WILSON has moved to set up a "Military Production Urgencies System" so that the services will be able to work out the end items requiring priorities before and after Mobilization Day.

Until M-Day, a new Military Production Master Urgency List will consist of items most needed by the Army, Navy and Air Force to carry out the assigned objectives of the Joint Strategic Capabilities Plan. Each item will be considered of equal importance.

After M-Day, each service will arrange its list to show relative urgency of production then prevailing. The Joint Chiefs of Staff will then help consolidate the department lists into one master roster, working out for example whether B-52 bombers are more urgently needed than atomic submarines.

Also authorized under the system are specific urgency lists, e.g. which plants should be expanded first, which projects get first call on scarce materials and production equipment, manpower, transportation, etc. Canadian projects are considered on a par with those of U.S. manufacturers under the plan.

ORDER FOR CONSTRUCTION OF THE FIRST atomic-powered flying boat should be placed by the Navy soon. Convair and Martin have been the only companies working with large water-based transports of late, and one or both will presumably win a development contract.

MARINE CORPS' EIGHT-MILE-RANGE Lacrosse guided missile, which was developed by Cornell Aeronautical Laboratory, will be mass-produced by Martin. Procurement agency for the missile, designed for close support of ground troops, is Army Ordnance.

GENERAL ELECTRIC'S 15,000-POUND-THRUST CLASS J79 turbojet, destined to power later versions of the Lockheed F-104 day superiority fighter, Convair B-58 supersonic bomber and other aircraft, has passed its 50-hour qualification test. Both military and company officials are enthusiastic about the performance of the J79.

DOUGLAS HAS BEEN TALKING TO GENERAL ELECTRIC about use of GE power plants for commercial airliners. Since the USAF probably won't release the J79 for commercial use yet, and since the talks presumably don't involve the J73 (which is in the same 10,000-pound-thrust-class as the Pratt & Whitney J57 in the DC-8) the discussions probably concern either the new GE turbofan engine now under development or the British Napier Eland turboprop, which it will build under license if the demand exists.

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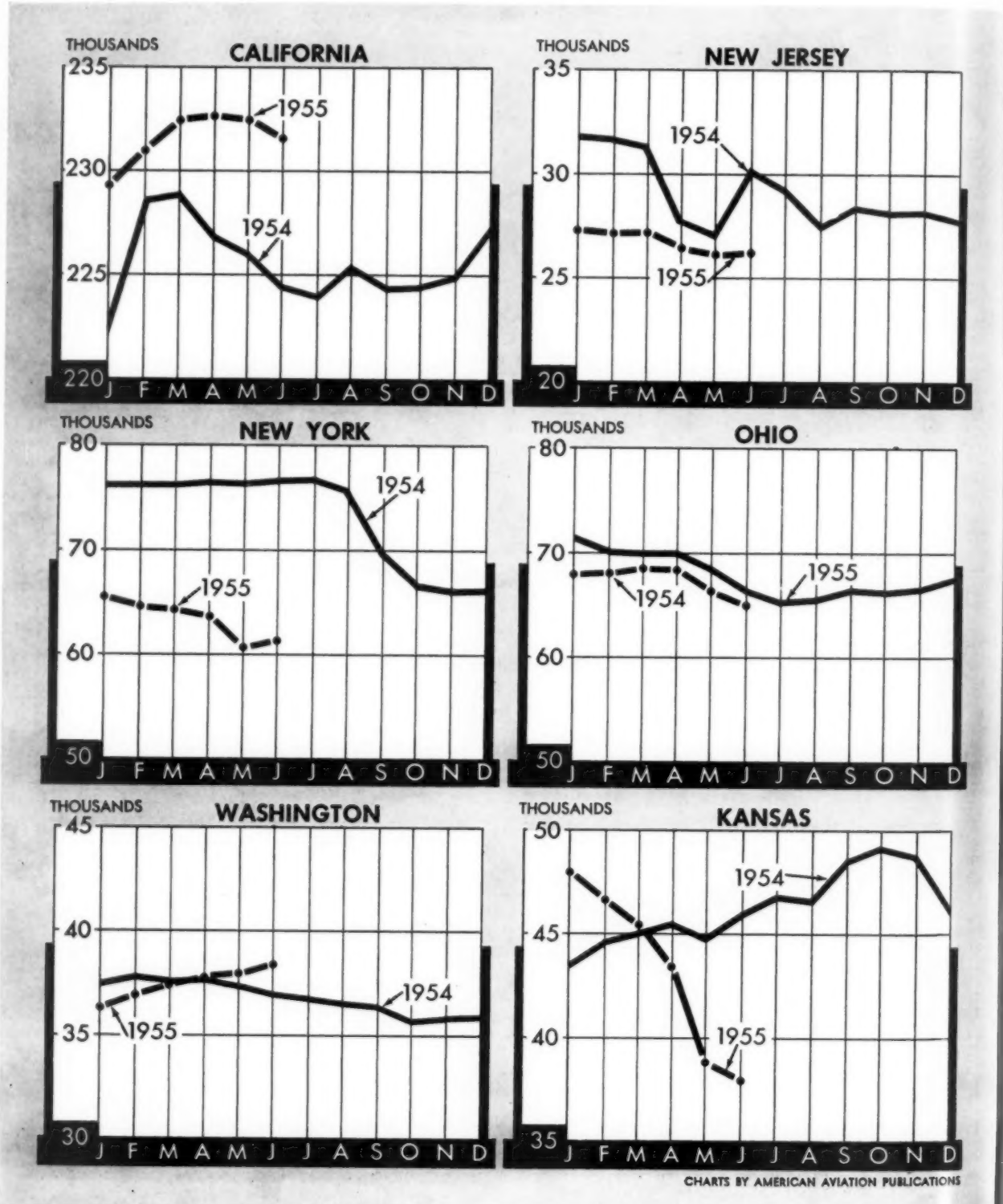

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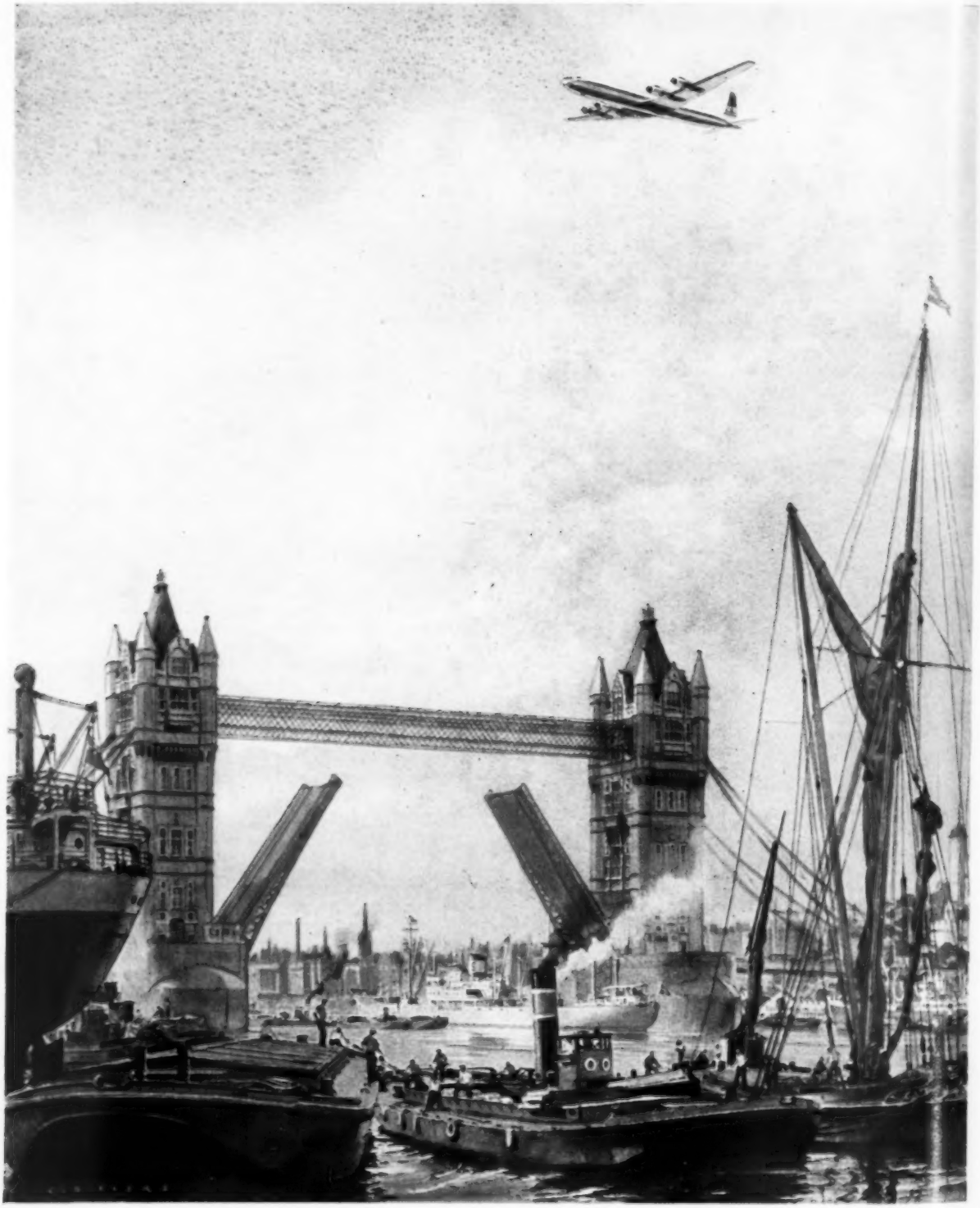

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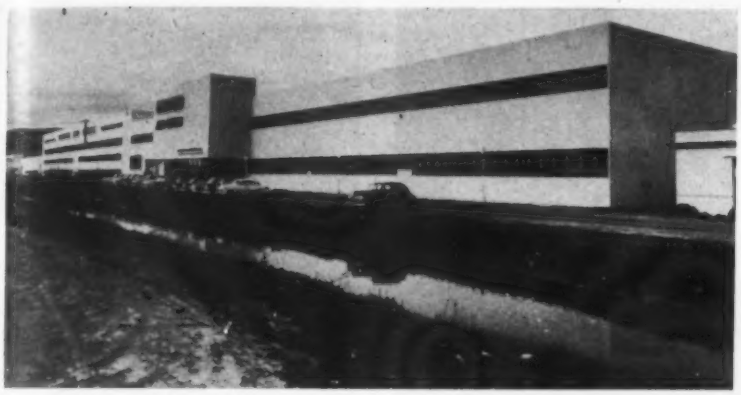

NEW FACILITY for United Air Lines engineering and production divisions at San Francisco is completely airconditioned. Air diffusion system is built by Anemostat Corp. of America.

AF Policy Boosts 'Small Business'

A strengthened role for small aircraft component manufacturers and subcontractors in military defense procurement is virtually assured under new Air Force policy recently set by Maj. Gen. David H. Baker, director of procurement and production.

Senate Small Business Committee has disclosed that USAF has urged its prime contractors to establish a defense subcontracting small business program having as a minimum the provisions set down in Department of Defense Instruction 4100.20.

Quoting excerpts from a letter sent major contractors by Gen. Baker, the committee noted that many AF prime contractors already have established such programs. Those that have not done so have been urged to implement a "small business" activity and to name an executive to act as small business liaison officer.

No Firms Barred, Says Defense Offical

Although present Pentagon policy is to place orders with companies that can be counted on to turn out military hardware in event of emergency, it is not Defense policy to block companies from getting defense business, says Asst. Defense Secretary Thomas Pike.

Pike points to significant statistics for the five months ending June 30 which show a 31% turnover of contractors receiving orders for items on Defense Department's "preferential planning list." In that period, 58 contracts went to firms not at the time engaged in producing the items.

The Defense official adds that military procurement officers have been instructed to avoid undue concentration of orders in a few large firms.

FACILITIES

• **USAF Air Research and Development Command plans immediate construction of a new $1-million electronic testing and flight simulation laboratory at Wright Air Development Center, Dayton. Reeves Instrument Corp. of New York City will handle construction.**

• New manufacturing facility at Babylon, N. Y. will be placed in operation by **Fairchild Engine & Airplane Corp.**, Stratos Div., in October.

• **Minneapolis-Honeywell Regulator Co.** is building a $750,000 addition to its aeronautical engineering and research facilities in Minneapolis, with occupancy slated for next spring. The 45,000-sq. ft. expansion will be used for aircraft and missile automatic control system development.

FINANCIAL

• **Avco Manufacturing Corp.** has acquired interest in Hycon Manufacturing Co. through purchase of newly-issued Hycon convertible debentures at $500,000 and 60,980 shares of outstanding common stock. In exchange, Hycon receives 73,139 shares of new Avco common stock.

• Common stock of **Emery Air Freight Corp.** has been admitted to trading on the American Stock exchange. Firm's outstanding shares total 327,650. In recent trading over-the-counter, Emery stock ranged from $8 to $9 per share.

CONTRACTS

• **Bell Aircraft Corp.** has entered into agreement with Nuclear Science and Engineering Corp. under which advice and assistance will be provided Bell on nuclear problems. NSEC will also evaluate potential application of Bell's manpower and facilities in the atomic energy field.

• **Kittel-Lacy, Inc.** will build five new jet engine test cell installations and modify three existing facilities under a new $499,186 Navy contract.

• Orders for 500 Wright EA 1 turbo compound engines for Douglas DC-7C transports have been placed with **Wright Aeronautical Div., Curtiss-Wright Corp.** by Douglas and ten airlines.

• **Bell Aircraft Corp.**, Texas Div. is developing an "ideal" set of all-weather helicopter flight instruments under a contract sponsored jointly by Navy Bureau of Aeronautics' Office of Naval Research and Army Transportation Corps. Melpar, Inc. is studying application of past, present and future navigation aids in development of a specialized air traffic control system for the Army.

• **Pan American World Airways** is modifying 20 to 25 Avianca DC-3s to Hi-Per DC-3s powered by Pratt & Whitney R2000 engines at a cost of more than $2 million. Work is being handled at PAA's Brownsville, Tex. base.

PROFIT & LOSS

Firm	Period Ended	Current Net	Previous Net	Earnings/Common Share Current	Previous
American Airlines	6 mos. 6/30	$ 8,537,418	$ 5,014,035	1.13	0.66
Boeing Airplane Co.	6 mos. 6/30	13,635,550	17,349,618	....	....
Chance Vought	6 mos. 6/30	1,755,062	3,209,906	1.63	2.97
Delta Air Lines	Year 6/30	1,911,000	1,305,949	3.61	....
*Fairchild E & A Corp.	6 mos. 6/30	2,108,000	2,228,000	0.73	0.96
Los Angeles Airways	6 mos. 6/30	41,408	.....	....	....
McDonnell Aircraft	Year 6/30	4,555,795	3,621,417	6.33	5.03
Menasco Mfg. Co.	Year 6/30	*1,000,000	*1,000,000	....	....
Mohawk Airlines	6 mos. 6/30	62,400	.....	....	....
North Amer. Avn.	9 mos. 6/30	23,635,000	14,525,000	6.88	4.23
Northwest Airl.	6 mos. 6/30	412,075	—332,729	....	....
Sperry Rand Corp.	Q 6/30	9,027,895	.....	0.35	....
Temco Aircraft	6 mos. 6/30	1,402,990	1,325,160	0.84	0.79

* Approximate

DIVIDENDS

Firm	Period	Amount	Payable	Record Date
Avien, Inc.	Initial	7.5¢	Sept. 20	Sept. 7
Boeing Airplane Co.	Q	50¢	Sept. 9	August 19
		**25¢	Sept. 9	August 19
Chance Vought	..	40¢	Sept. 26	Sept. 9
Consolidated Diesel	..	10¢	Sept. 30	Sept. 15
Curtiss-Wright	Q	40¢	Sept. 28	Sept. 7
Delta C&S Air Lines	Q	30¢	Sept. 5	August 17
Lockheed Aircraft	..	60¢	Sept. 10	August 19
Menasco Mfg. Co.	SA	15¢	August 22	August 10
		** 5¢	August 22	August 10

** Extra Dividend

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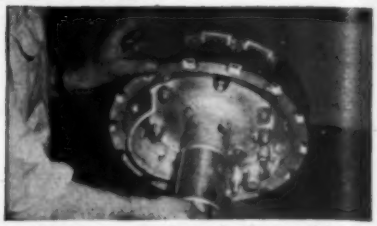

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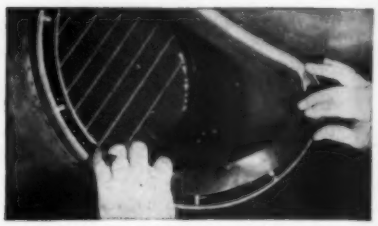

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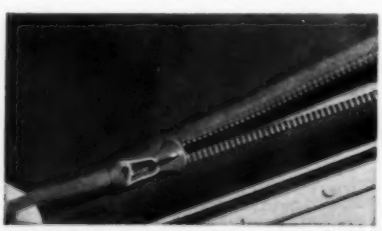

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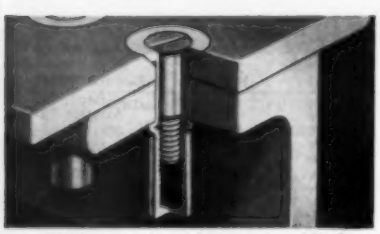

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VOL. 19, NO. 8

Defense's 'Second-Source' Program Drying Up

- **Only Ford-Chicago has enough backlog orders to keep producing for at least two years.**
- **Buick's Flint, Mich., and Willow Springs, Ill., plants phasing out on J65s.**

By ROBERT M. LOEBELSON

THE PENTAGON'S "second-source" program for large-scale production of vitally needed aircraft and engines—a policy begun just after the Korean War started five years ago—will virtually terminate next week.

About September 15, General Motors Corp.'s Buick Motor Division at Flint, Mich., will turn out its last components for the Wright Aeronautical Corp.-licensed J65 turbojet. By November, Buick's assembly facility at Willow Springs, Ill., will have put together the last of nearly 4,500 J65s ordered by the USAF between February 1951 and the present.

With the Buick phase-out, there is only one major second-source—the Ford Aircraft Engine Division at Chicago, which has enough of a backlog for Pratt & Whitney J57 turbojets to keep it producing until at least October 1957 and probably well into 1958.

(Lockheed-Marietta and Douglas-Tulsa are both still alternate producers of the Boeing B-47 Stratojet but their B-47 work is scheduled to stop before the end of 1955.)

This writer, who recently visited many of the secondary sources, has concluded that the entire program, while considered highly necessary at its inception in 1950, has nevertheless now reached the stage where it will be next to useless if a war should start anytime in the near future.

• **In the first place,** the second-source (or "base-broadening") policy inaugurated by Gen. George C. Marshall and Charles (General Electric Co.'s) Wilson, Korean War era Defense Secretary and Defense Mobilizer, respectively, has been marked by vacillations from the very beginning, resulting in the loss of several billions. (Buick, for example, was originally scheduled to turn out 2,225 J65s each month. This was later revised to 1,600, then 1,100, then 600 and finally 300 a month. Other second-source producers have encountered similar situations.)

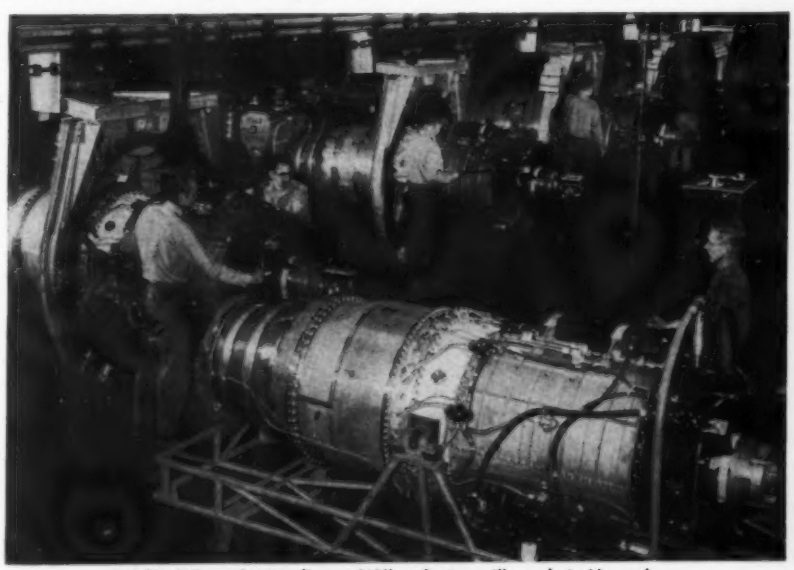
• **Moreover,** while present Pentagon and Office of Defense Mobilization policy is to stockpile the machine tools of the secondary producers in one spot so they can be put into operation quickly if the need arises, *not one of the engine companies says it would be able to get into production again in less than a year, even under a crash program.*

• **In addition,** even though the required tooling is kept in a central location, the manpower with the know-how to produce planes and engines has frequently been lost after military contracts ended.

• **And lastly,** the engines and airplanes built under second-source contracts are already either obsolete or obsolescent. After tools for a given aircraft or power plant are stockpiled, the second-source company in effect forgets about the program because it is not kept aware of various design changes and improvements being made by the prime company. Thus, if the engine or plane are ordered back into production on M-Day, the second-source company will have only the know-how to build the same dash-number product it was turning out months or years earlier.

Just after Korea, when the Joint Chiefs of Staff and the ODM were worried about the possibility of expansion of the "police action" into a major global war, almost every automotive company was brought into the aircraft production picture, and many aviation firms became second-sources as well.

• **Studebaker Corp.,** South Bend, and **Packard Motor Car Co.** (since merged into Studebaker-Packard Corp.) both became producers of the General Electric J47. Studebaker delivered its



Buick's J65 production line at Willow Springs, Ill., ends in November.

last J47 in 1954, Packard on June 30, 1955.

• **Nash-Kelvinator,** Kenosha, Wisc., which delivered about 17,000 Pratt & Whitney R-2800 piston engines in World War II, got the go-ahead to resume production of the same engine after Korea. Between August 1953 and June 1954, 1,176 R-2800s were built under P&W license.

• **Ford-Chicago** took over the facility used by Dodge to build R-2800s during World War II and delivered 3,079 P&W R-4360s. A total of 1,889 dash 63s were delivered to Douglas for the C-124, 590 dash 59s to Boeing for the KC-97, and 590 dash 53s to Convair for the B-36. Ford also has been delivering P&W J57s for USAF planes since April 1954, including the dash 1, dash 29, and dash 19 for the Boeing B-52, the dash 7, dash 39, and dash 21 for the North American F-100, the dash 13 for the McDonnell F-101, the dash 23 and 31 for the Convair F-102, and the dash 31 for the Boeing KC-135 jet tanker.

• **Ford's Lincoln-Mercury Division** at Romulus, Mich., at one time was designated a second-source for the Westinghouse J40 but difficulties with that engine resulted in cancellation of the second-source project.

• **Chrysler Corp.** took over a newly-built Navy plant near Detroit to build the P&W J48 but that program never got started either. The facility is now being used for Chrysler's Army Redstone missile and other work.

• **Chevrolet Aircraft Engine Division,** Tonawanda, N. Y., began production of the Wright R-3350 Turbo Compound engine after Korea and phased out in 1954. Chevrolet's machine tools to produce the powerplant are now in storage.

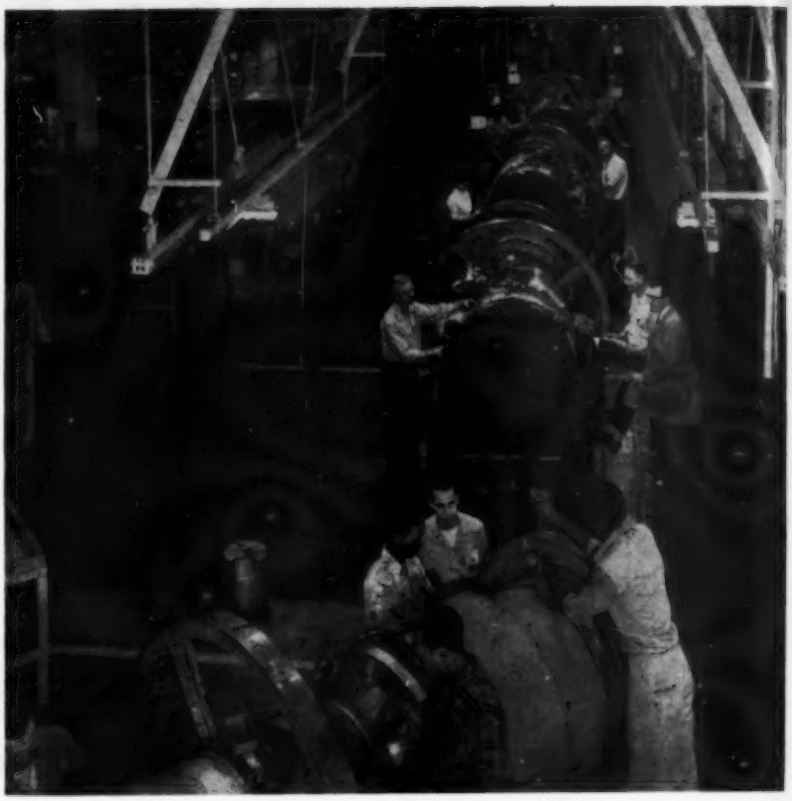
• **Buick** simultaneously started J65 output.

On the airframe side:

• **Lockheed-Marietta** and **Douglas-Tulsa** both became sources of production for the Boeing six-engine Stratojet but Strategic Air Command requirements for the medium bomber have just about been met (more than 1,500 built at the three plants) and the licensee producers will quit the B-47 program shortly.

• **General Motors,** which built a new dual-purpose (civilian-military) plant at Arlington, Tex., was scheduled to build the Grumman S2F anti-submarine plane but reduced requirements prevented the inception of this particular program.

• Another GM facility, the Buick-Oldsmobile-Pontiac plant at Kansas City, became a licensee producer of the Republic F-84F Thunderstreak, turning out about 500 of the swept-wing fighter-bombers before delivering the last one in May.



Ford-Chicago will be delivering these Pratt & Whitney-licensed J57s for at least 2 more years.

• **Temco Aircraft** at Dallas had been scheduled to become a second source for the McDonnell F3H carrier jet fighter for the Navy but was eliminated when Navy requirements for the Demon were cut back. Some of the tooling paid for by the Navy at Temco-Dallas, however, was put to use when Temco became a large subcontractor to McDonnell.

• **Kaiser-Frazer Corp.'s** Willow Run, Mich., plant was designated a second-source for the Fairchild C-119 but its contract was canceled in 1953 after 71 Flying Boxcars were delivered. Fairchild itself started tooling a Chicago facility for C-119 production but the USAF reversed its policy and Fairchild-Chicago never produced a plane.

One point rapidly becomes evident when executives of automobile firms making aircraft and engines speak freely: The auto industry is not enthusiastic about military aircraft work, mainly because profits are nowhere near those which can be made in building and selling motor vehicles. Virtually all of these automotive companies are quite content that their military plane and engine commitments are over with because they can now use the space for production of automobiles and parts.

But the USAF's investment in second sources is sizeable. Examples:

• **Buick's contracts** total $635 million for engines and tooling and $109 million more for facilities. Included as part of the facilities are more than a million square feet at Willow Springs and 600,000 square feet at Flint, 500,000 square feet at the Oldsmobile plant in Lansing, Mich. (J65 compressors, rotors, turbines, shafts, etc.) plus additional space at two Buick suppliers, Brown-Lipe-Chapin at Syracuse, N. Y., and Elyria, Ohio (compressor and turbine stator blade assemblies) and Harrison Radiator, Lockport, N. Y. (tail cones and combustion chambers).

• **Ford-Chicago's** announced contracts for J57s come to more than $600 million to date. And since the average price for the more than 3,000 R-4360s was about $75,000 each, the Ford plant has probably received more than $1 billion in USAF contracts since taking over the facility in October 1950. Production of the P&W R-4360 Wasp Major continued from March 1952 to August 1954, with the first J57 being delivered by Ford in April 1954.

• **Nash-Kenosha** received $25 million in facilities money and an additional net of $113 million for the 1,176 R-2800s it delivered for such aircraft as the Chase-Fairchild C-123B, Convair C-131A, T29C and T-29D, the subsequently canceled Beech T-36A and the Douglas C-118.

One tangible benefit has come out of the multiple-source program. Licensee producers of complete aircraft

and engines have been urged by the Pentagon to find their own suppliers rather than rely on the subcontractors, vendors and suppliers of the aviation company which designed the airframe or engine in the first place. In some cases after Korea this proved to be impossible and one company produced parts for both the prime and second source. But in most others, the automobile firms developed their own subcontracts. Examples:

• **Buick** used Oldsmobile, Brown-Lipe-Chapin and Harrison Radiator for J65 components.

• **Ford-Chicago** employs Thompson Products of Cleveland for turbine blades, wheels and spacers, Ex-Cell-O Corp. for blades and disks, Solar Aircraft for afterburners and compressors, Ryan Aeronautical for stampings, Bendix Aviation and Hamilton-Standard Division for controls, I-T-E for stampings, Rheem's Aircraft Division at Downey, Calif., for welded parts and Kelsey-Hayes for spacers and turbine wheels.

• **Nash, on the other hand,** did much of the R-2800 work internally. About 564,000 square feet at Kenosha was used for Double Wasp assemblies, the Nash plant at Milwaukee utilized 199,000 square feet to produce crankcases, 175,000 square feet at Nash-Detroit was devoted to cylinder assemblies, and 50,000 square feet at Nash-Grand Rapids was given over to output of pistons. Major Nash subcontractors include J. I. Case Co. (crankshafts at Rock Island, Ill., propeller shafts at Racine, Wisc.), Houdaille-Hershey of Decatur, Ill. (master and articulating rods), Deepfreeze Appliances, North Chicago (pumps and sumps), and Aircraft Gear of Fort Wayne, Ind. (gear trains).

But as the automobile companies cease their licensed aircraft production, their suppliers usually do too, leaving the Pentagon not much better off than when the base-broadening policy was begun. In most cases, the trained personnel of the suppliers remain on the payroll but usually switch over to automotive or other work. But as in the case of the auto firms building complete aircraft or engines, the components built by vendors to the auto companies become obsolete along with the engine or airframe. Any Pentagon order to resume production will cause frantic efforts to catch up on modifications made since output was stopped.

• **As a result of their** experience with second sources during both World War II and the Korean War, it is evident that Pentagon planners must either abandon the concept completely, keep aircraft pilot lines going in automobile plants (at tremendous cost because of the small quantities involved) indefinitely in peacetime years, or revert to the policy in effect before World War II.

Latest J57s In Production at Ford-Chicago

J57-F-1—Basic engine used in the B-52.

J57-F-7—Basic F-1 plus afterburner for the F-100.

J57-F-13—Similar to the F-7 and used in the F-101.

J57-F-19—Improved F-1 featuring a titanium compressor but no afterburner. Used for the B-52.

J57-F-21—An F-19 with the titanium compressor and an afterburner for the F-100.

J57-F-23—Similar to the F-21 for the F-102.

J57-F-29—Similar to F-19 and utilized for the B-52, Stainless steel replaces titanium in the compressor.

J57-F-31—Similar to the F-19 and employed for the KC-135.

J57-F-39—Advanced F-7 featuring a cabin air pressurizing system which provides 10% additional power for the F-100.

If, as many high USAF and other Pentagon officials believe, the next war will be decided in a matter of hours (or days or weeks), there is no need for additional sources for planes and engines. They could not get into production soon enough to change the decision in this day of intercontinental bombers and hydrogen weapons.

• **On the other hand,** if it is felt that any future war will last long enough for the U.S. to overwhelm its adversary by sheer quantity production (as happened during World War II, when the U.S. became the "arsenal of democracy"), then a case can be made for keeping secondary sources operating on a small scale permanently.

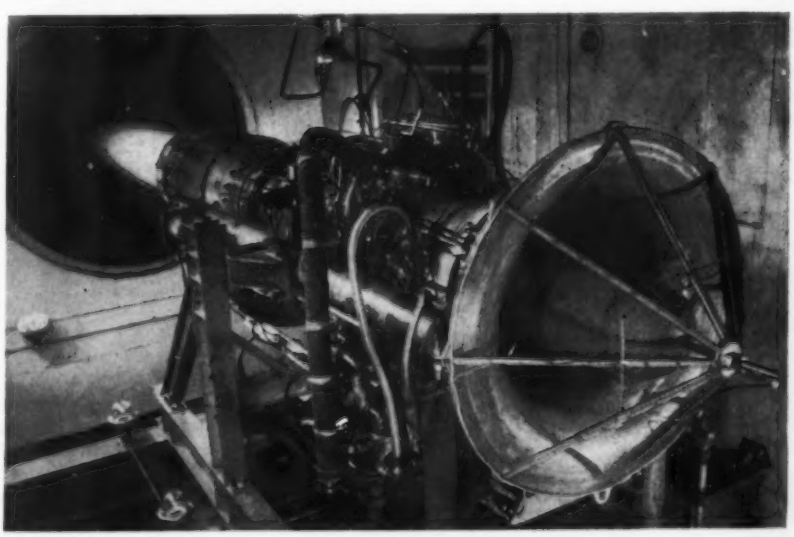
(Aircraft industry spokesmen would quickly point out, however, that the money which would be required to keep aviation pilot lines going in automotive plants could be used to better advantage within the aviation industry. And that logic is very hard to refute.)

The only other apparent alternative is for the Pentagon to concede that while second sources served an important purpose between 1950 and 1955, their advantage is gone once production stops. In retrospect, it is easy to see that billions could have been saved by having the aviation companies expand to deliver the planes and engines themselves. But hindsight is always easier than foresight and no one can condemn those who decided in 1950 and 1951 to forget about added costs and bring other firms into aviation production, because a war with Russia might easily have begun at that time.

• **During those days,** the Joint Chiefs of Staff were reporting that the nation's period of "maximum danger" of a sneak Russian attack would be sometime about the middle of 1952.

The billions poured into the second-source program over the past five years cannot be called wasted. The military services did get airplanes and engines in quantities from the auto companies. (Of course, they could have gotten more for less money from the prime aviation firms which designed the products.)

During the buildup period, additional sources were available for even greater output if the need arose. Now that all but Ford-Chicago are just about out of the picture and it is evident that little time would be gained by bringing the auto firms back after M-Day, some revisions in thinking will have to be made by both the Defense Department and the Office of Defense Mobilization. • • •



Ford J57 in test cell.

HITCHING A RIDE in a Blackburn and General Aircraft Ltd. production Beverley is this Westland S-55 helicopter. Both aircraft went to North Africa last month for the tropical trials at Idris, Tripoli. Trials are under auspices of Ministry of Supply. Beverley, Britain's largest transport to date, is powered by four Bristol Centaurus engines and has a normal range of 1,600 miles with a top speed of 238 mph.

Declassification of TACAN Details Fails to Clear Air in Navaid Dispute

By LOIS C. PHILMUS

The declassification of the technical details of TACAN recently brought forth the inevitable surge of comparisons between it and VOR/DME. From data currently available, it is becoming apparent that neither system has any appreciable superiority over the other. Both meet certain common system requirements equally well, with VOR/DME fulfilling some others that TACAN does not and vice versa.

The acknowledgment of this by many officials and observers has led to a great deal of speculation on the advisability, from a financial standpoint, of replacing an interim system with another that shows no promise of greater longevity.

AMERICAN AVIATION has learned that there is evidence of growing interest in the frequently mentioned "third" system for short range navigation. It was brought out during some of the Congressional hearings that this calls for using existing DME and moving the VOR omniranges into a higher frequency.

Interest also has been expressed in preserving the status quo and getting a technical group of military and civil experts together to begin work on an eventual system that will meet long-range common system requirements for high altitude flight (which needs special channel handling), helicopters (which cannot use line-of-sight equipment), etc.

• **To dampen the ardor** further for the Navy's candidate for the common system are unconfirmed reports of some major snags encountered in the current evaluations. Major problem, it is understood, has been the availability of interference-free channels. A secrecy screen surrounds other difficulties.

Although it is generally agreed that the untried TACAN can eventually be brought up to the same degree of reliability as its rival system, extensive re-engineering, testing and time will be needed. Another common system requirement for voice communication is still another "uncertainty." The official Department of Defense release observes that such a requirement may be incorporated, but engineers maintain that TACAN cannot be equipped to handle two-way voice communication.

The 110° cone of confusion revealed does not compare favorably with the 55° claimed by VOR and neither accommodate the common system requirement of "not larger than 30°."

• **To further complicate matters,** TACAN's bearing information accuracy of 1°—one of its major recommendations—is now being compared to VOR. Although the quoted figure for VOR is 3°, certain CAA evaluations are now claiming azimuth bearing accuracies of from .6° to 1.1° for periods as long as six months. Some experts say that greater accuracy than the 3° cannot be built into existing omnis.

TACAN's chief advantages now remaining are more desirable siting requirements, mobility and shipboard installation capabilities. Of the three advantages, siting is the only one spelled out in Air Coordinating Committee's operational requirements for short-range navigation element of the common system.

Of increasing concern now, AMERICAN AVIATION has been told, is the fear of undue delays which would perpetuate the present confusion on the future of short-range navigation indefinitely. Congress made it clear that before the Department of Commerce or the military ask for further funds in the next session (beginning in January), the situation must be finally resolved. The ACC policy (following the February Air Navigation Development Board release), called for VOR to remain operational until 1965, and DME until 1960, has become clouded by subsequent events and discussions.

The need for clarification by the first of the year is felt to be mandatory by both government and industry interests. The present vacuum has caused 103 DME stations, ready for commissioning, to stand idle for the present fiscal year. CAA is preparing and has already approved instrument airport procedures for DME, which could contribute much to the congested air traffic control picture.

• **ANDB is aware** of its responsibility to come forth with as accurate and rapid an evaluation as is possible. But delays have already been experienced. The special advisory committee charged with spelling out minimum requirements has already delayed issuance of its report three times. New time of release is now set for the last week in September or early October.

The target date of August 1 for the National Bureau of Standards evaluation of channel requirements and Airborne Instruments Laboratory's problem of determining interference was an admitted "ideal." Target now is to complete both by late October or November.

Beech Aircraft To Build Navy Drone

Beech Aircraft Corp. will build a new pilotless, remote-controlled Navy targetplane under a Bureau of Aeronautics contract won in competition with eight other competitive designs.

Delivery of a small number of the new drones, designated the XKDB-1, will start within a year.

The XKDB-1 is a high wing design with a V-tail. Wing span is 12½ ft., length 13½ ft. and gross weight less than 600 pounds. Power plant is a six-cylinder, horizontally-opposed, two-cycle turbosupercharged model.

The Beech drone is built for launching by catapult from bases on ship or shore and is adaptable to air launching. Recovery for re-use is provided by a parachute installation.

Inconsistency Marks Airlines' Ignition Experience

By JOSEPH S. MURPHY

SIDNEY, N. Y.—Inconsistency seems to remain the order of the day with aircraft engine ignition system performance. It prevails not only between different airlines in their experience with identical ignition systems on identical aircraft, but also in the performance registered from one year to another by individual carriers.

This situation was never more evident than late last month as more than 100 aviation specialists convened here for the 2nd annual Aircraft Engine Ignition Conference sponsored by Scintilla Division, Bendix Aviation Corp.

Pointing out that there is a 40-to-1 spread in ignition system distributor removals between operators on the same systems in the same aircraft, H. Clayton Welch, Scintilla engineering supervisor, cautioned the record attendance that "it's pretty hard to design that type of variation out of the equipment."

• **One contributing factor,** Welch conceded, is airline inconsistency in reporting component failures. Some register all premature changes, regardless of the fact that during subsequent shop inspection, many units check 100% satisfactory. Other carriers only report component removals in which shop defects are later found.

This condition, however, only influences the wide difference in operating experience between one airline and another and does not explain the year-to-year fluctuations in the record achieved by individual carriers.

As an example, Welch cited distributor removal statistics for 11 carriers operating Douglas DC-6B aircraft which showed that only four recorded a lower rate in 1955 than in 1954. The remaining seven, although generally incorporating the same design improvements in their ignition systems, reported a higher removal rate.

This same trend prevailed for virtually all aircraft/engine combinations and, almost without exception, carriers with the lowest change rate in 1954 were the only ones that improved their operation in 1955.

Airline Ignition Experience

• **Still a major cause** of mechanical delays in airline operation, engine ignition systems during the past year showed a marked variation in performance by aircraft types. Best record was attained by newer aircraft such as the DC-7 and Lockheed 1049—the poorest by the most complex system, that on the 28-cylinder Pratt & Whitney R4360 engines on Boeing 377 Stratocruisers. Chart below shows average performance for all airlines as well as the best and worst airline experience for each aircraft type.

Aircraft Type	No. of Airlines	Delays per 1000 Engine Hours Average	High	Low
Douglas DC-3	11	1.25	2.40	0.07
Douglas DC-4	15	1.49	4.55	0.21
Douglas DC-6/A/B	15	1.25	4.30	0.14
Douglas DC-7	3	1.01	2.55	0.15
Lockheed 049/749	8	1.24	3.20	0.22
Lockheed 1049	7	0.88	2.05	0.13
Boeing 377	3	3.06	6.20	1.38

New System Progress

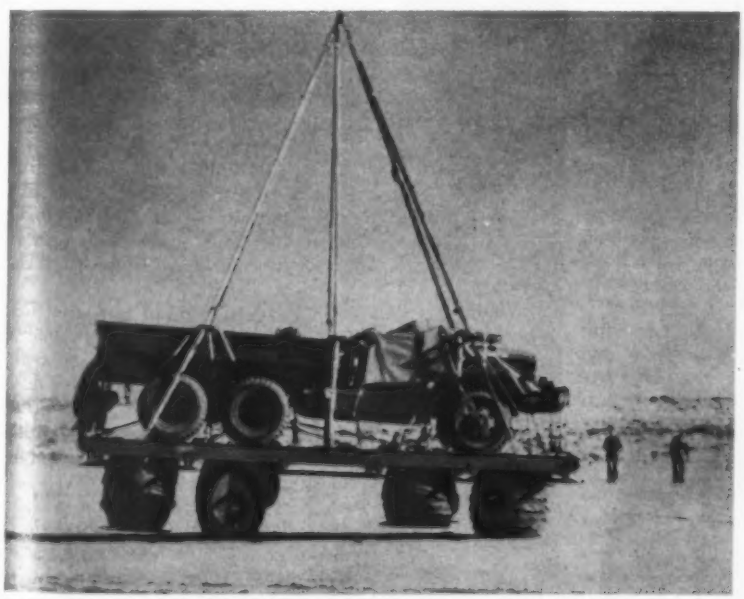
• **Prospects** of the introduction of radically new ignition systems, although strong at last year's meeting, now appear dim. Of three such developments under consideration, Scintilla gave this report:

• **Shock-Mounted Distributor**—Improved operation with present systems, coupled with a slackening of the theory that vibration is almost the prime factor in distributor troubles, makes further development, building and testing of this system unwarranted at the present time. As a result, Scintilla has shelved the project until vibration indications begin to play a bigger part in distributor performance.

• **No-Brush Distributor**—A breadboard design of a distributor using no brushes or moving parts, unveiled at the 1954 conference, shows very good possibilities for installations that fire an even number of cylinders. However, on odd numbers of cylinders such as in the R2800 and R3350 (nine per row), the circuitry becomes difficult and cumbersome to handle. Although not an impossible situation, Scintilla engineers feel it borders on the impractical.

• **Condensor Discharge System**—An adaptation of jet engine ignition to piston engine systems, this Bendix-developed design is now on engine test and still being evaluated. It is intended primarily to improve spark plug operation under conditions of lead fouling, but whether this improved plug life and operation would warrant the complete change of an ignition system, Scintilla feels, is still rather difficult to answer.

Although the company plans no extended program for further development of this design, should new piston



"BEER BARREL" SHOCK ABSORBERS, filled with air, cushion impact of 2½-ton truck as it hits ground during tests at Naval Auxiliary Air Station, El Centro, Calif. Developed by Firestone Tire & Rubber Co., "Aero-Pallet Cushions," as they are called, cut landing shock by two-thirds, then collapse. They may be used as many as 20 times, according to the manufacturer.

engines be designed or developed, either this system or many of its features would definitely be considered.

Service Improvements

• **Most of the discussion** at this year's conference centered around engineering fixes developed by Scintilla to improve performance of current systems. Major subjects covered for the various types of engines were:

• **P & W R2000**—Scintilla has changed to a new design cam breaker, identified as the American Felt type, using Thuban oil and having a longer cam follower. Primary condensor in this system has also been changed to incorporate extra mica between foils to overcome previous failures due to foil puncture.

• **P & W R2800**—Changes to this system over the past year affect the magneto, distributor, harness and high tension coils. In the magneto, black rubber in the magneto-to-harness lead has been changed to grey to overcome age cracking, and a hard rubber insert has been installed in the lead connector.

To prevent oil leakage, an O-ring has been added in the magneto drive adaptor, and Scintilla is now in the process of providing an O-ring groove on the drive shaft to close off another path of possible leakage.

In the R2800 ignition harness and distributor, principle changes involve: use of Wirelon ignition leads; tighter floating fit bearings of .0002″ to .0006″ and adoption of first the Pure E112HH carbon brush and later the Speer 527 carbon.

Improvements to high tension coils involve investigation of the addition of a rubber boot for these components, and the location of the coil in the engine cylinder baffle to absorb some of the existing tolerance and prevent wear to both the baffle and coil.

• **P & W R4360**—In the R4360 system, Wirelon leads are provided in the primary circuit, the anti-rotation device has been removed from the upper bearing, and a lip type oil seal installed on the drive end.

In addition, the distributor finger has been changed over to the coil spring type using the Speer 527 carbon brush. Scintilla is also testing a two-piece band clamp for the R4360 magneto cover and expects soon to release a number of clamps to airline for service evaluation.

• **R3350 Engine**—Majority of system changes discussed at the session affect the R3350 engine now seeing wide usage on DC-7 and 1049C aircraft in the turbo compound version. In this system the primary lead length has been changed to prevent wire chafing and bearing fits have been altered to the .0002″ to .0006″ tight fit for the floating bearing.

Other changes include use of a magnesium mounting flange in the magneto for an overall weight saving of 1.4 pounds, and a change from Marmon to Scintilla-built clamps. A new designed relay of the "beefed-up" type has also been tested and approved.

In the R3550 distributor, thicker ears are provided on the mounting flange along with a steel plate at the hold-down bolt locations to eliminate possible wear at that point. Also included are a heavier cross-section in the distributor bowl, a new heavier manual advance relay switch and the coil spring distributor finger.

• **Scintilla is now developing** a molded high tension coil for the R3550 similar to that used on the R4360. Over one million coils of the latter type have been built with no service failures reported to date.

First version of an improved R3350 distributor bowl released in September 1954, Scintilla tests show, is ten times stronger than the preceding design. However, even with this added strength margin, there have been two or three failures in service and development is continuing.

Newer designs provide a heavy-eared flange, heavier bowl section, a filled-in section in the base, and a steel plate at the mounting studs to prevent damage from studs and washers. This type distributor, now entering production for EA1 and EA2 turbo compound engines for the DC-7C and Lockheed 1649, Scintilla feels, should more than fulfill requirements. • • •

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Candy Barr is firing a two-gun salute for a double-barreled reason:
(1) SAC beat its 150-day deadline with USAF jet engine overhauls and now is moving ahead with third-month production, and
(2) The shop, as usual, also is doing a great job for piston engine owners and Sept. 21 will join Pratt & Whitney Aircraft in a gala Engine Forum at Dallas.
P.S.: Candy will be at the Forum party — all green-eyed, blond-haired, 5' 3½", 122 lbs. of her!
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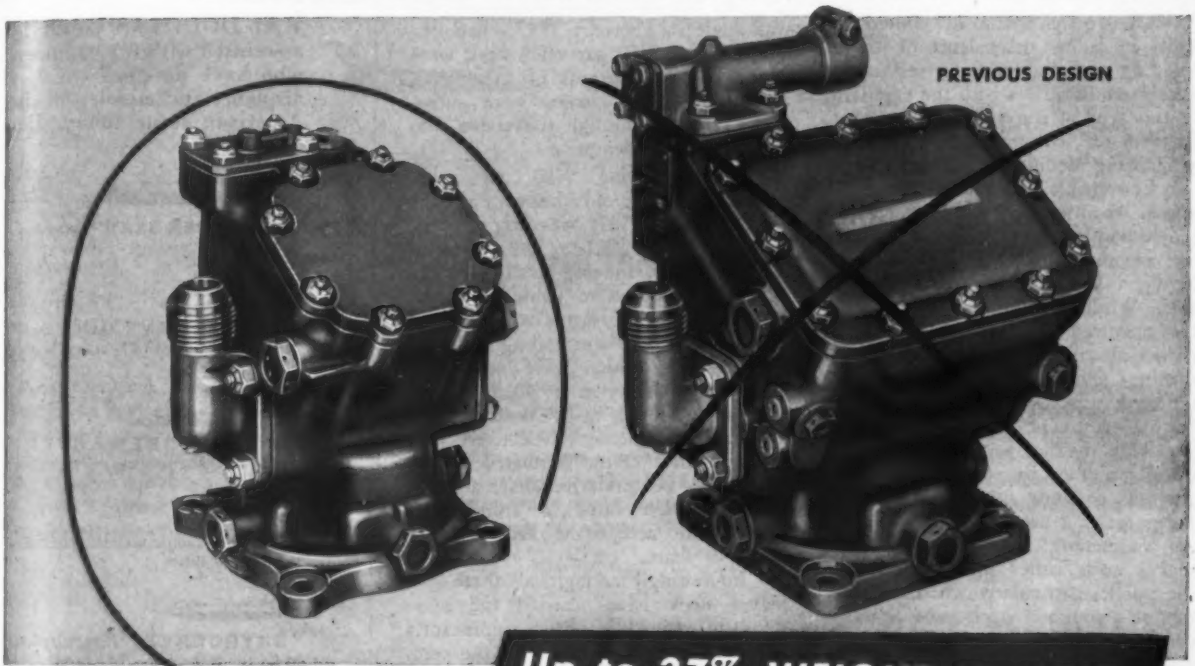

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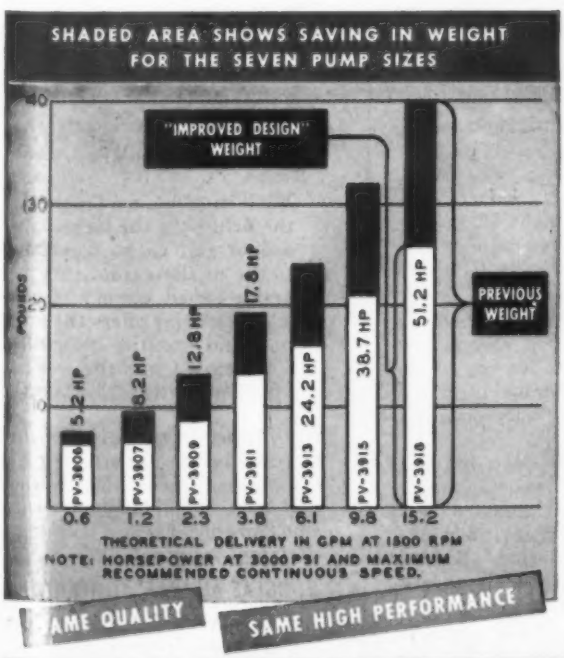

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FINANCIAL

Airline Convertible Preferreds Demonstrate Successful Record

By SELIG ALTSCHUL

The recent action of United Air Lines in calling the balance of its outstanding preferred stock for redemption once more illustrates both the popularity of this type of convertible senior security with the investor and its success as a financing medium to the issuer.

Convertible preferreds frequently appeal to investors as they enjoy a senior position over the junior equity—the common stock. Usually a stated dividend is mandatory when earnings exist. While enjoying this senior status the preferred also is in a position to participate in the future growth and earnings accruing to the company and reflected directly by the enhanced market stature of the common.

This financing medium is frequently applied by companies where a potential common stock issue is sold in the guise of a protected senior security. A "sweetening" process such as this makes such issues more palatable to the public, particularly when the direct sale of a common stock issue would be extremely difficult or could only be accomplished at a substantial discount.

• **For this reason,** corporate issuers find it desirable to market a convertible preferred. The hope is to sell the convertible issue and ultimately have it converted into common when the company's earnings and outlook warrant the taking of such action. Further, the market value of common shares is not immediately affected. There may be no dilution of earnings as conversion can be delayed until the additional capital produces earnings. In effect, by using the convertible preferred financing device, a company can for practical purposes place itself in a position to sell common stock in the future at a price above the current market. This is accomplished by setting the price for conversion into common at a point above the market price at the time of the sale.

Convertible preferreds have found limited utilization in past airline financing. United Air Lines has repeatedly demonstrated the success of convertible preferred financing both to itself in raising new capital and to the profit and satisfaction of the purchaser.

The present outstanding senior equity is the third in a series of cumulative convertible preferred shares issued by United. The first was created in January 1944, when 105,032 shares of $100 par value stock were sold for net proceeds of some $10.2 million.

The second senior equity offering was made in February 1947 when 94,773 shares of $100 par value stock were issued for net proceeds of more than $9 million. Both issues were subsequently retired through conversion into common and redemption.

• **The existing** $100 par value cumulative preferred known as the 4½% series of 1952 was originally issued in March 1952 to the extent of 223,865 shares, making available more than $22.3 million to United. Conversions aided by a recent earlier partial call reduced the outstanding issue to 48,752 shares which have now been called for redemption by October 10.

It is obviously to the benefit of the preferred shareholder to convert into common stock at the stipulated rate of 3.15 shares per preferred share and obtain a market value of around 133 rather than accept the call price of $104 per share.

Interestingly enough, all three preferred stock issues carried the same dividend rate, 4½%. More significantly and certainly to the credit of the company, dividend payments on all preferred issues outstanding have been made as due, despite a temporary period of deficit operations by the company in 1947 and 1948. All three United preferreds were marketed by nationwide investment syndicates headed by Harriman, Ripley & Co.

• **The largest piece** of airline senior equity financing took place when, in June 1946, American Airlines issued 400,000 shares of $3.50 convertible preferred. Some $40 million was raised through this issue and, together with about $40 million in straight 3% debentures sold concurrently, provided American with about $80 million for its initial postwar expansion program.

Taken together, this $80 million was the largest amount of new money raised for an airline at one time. Moreover, the terms and timing of the issues were probably the most favorable ever achieved by an air carrier. The 3% interest rate was the lowest on any long-term airline debt and the 3½% dividend rate on the preferred was never again equalled by any other airline senior equity financing. Kidder, Peabody & Co. arranged and managed the American Airlines financing.

American's preferred was originally convertible into common at $21 per share, or about 4.6 shares common for

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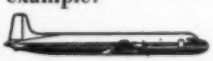

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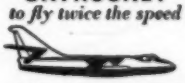

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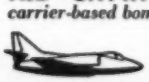

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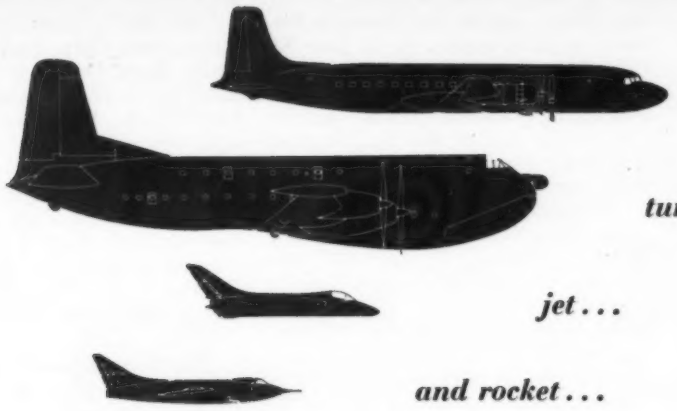

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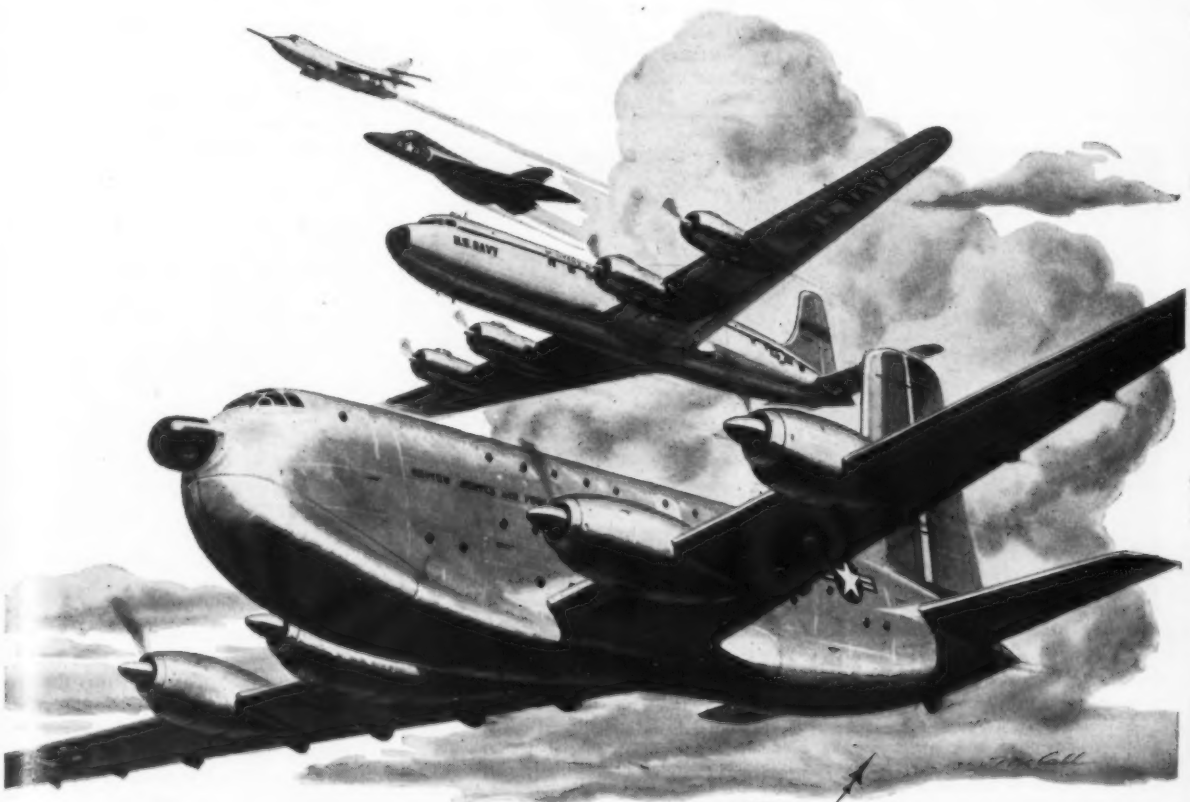

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each share of preferred. Adjustments in the conversion rate resulted through the issuance of options to company officials. The conversion rate is now 4.8379 shares of common for each share of preferred.

• **With the common** now paying an indicated quarterly rate of 20 cents per share, many holders of the preferred have been tempted to effect conversion of their shares. In other words, in so doing, if the common dividend payments are maintained at no lower than the present rate, instead of $3.50 in preferred dividends annually, $3.87 could be received through equivalent holdings in the converted common shares.

With the common selling comfortably above the conversion rate of the preferred, market quotations of American's senior equity have been quick to reflect this enhanced value. Earlier this year, American's convertible preferred sold as high as $139.50 and is now quoted around $118 per share. This represents a rewarding recovery from the low of $47 per share reached in the late 1948 tax trades. American maintained dividend payments on the preferred even during its short period of adversity.

Largely because of the higher income possibilities, considerable conversion of the preferred into common has been taking place in the American Airlines capital structure. As of June 30, 1955, 144,630 shares of preferred had been converted, leaving 255,370 shares outstanding. Present trends indicate that by the end of the year, at least half of the original preferred issue will have been converted.

• **Northwest Airlines** is the third major carrier with a convertible senior equity outstanding. In April 1947, the company sold 360,000 shares of a 4.6% preference stock issue at $25 per share for about $9 million. Because of operating misfortunes which befell the company, dividends were on a number of occasions suspended on this stock. (All arrearages, however, have been made good by subsequent actions and this stock is now on a current basis.) During 1950, the Northwest preference sank to a low of 15⅛.

As the airline industry recovered and Northwest was able to resolve its management problems, its preference shares have also reflected this improvement. They were last quoted around $32 per share. Each share of the preference stock is convertible into 1½ shares of common. At last reports, as a result of sinking fund operations, there were 331,016 shares of preferred outstanding.

• **The closest held** convertible preferred among the airlines is that issued by Northeast. It was issued in 1948 to refund obligations due Atlas Corp.

Of the original issue of 83,333 shares, Atlas Corp. received a total of 76,959 shares. During a long period, no dividends at all were paid on this preferred stock. Subsequently, all arrearages were paid and the issue is now on a current basis.

Following adjustment, the conversion rate on this stock was 5⅜ common for each share of preferred. This was the rate up to March 30, 1951. At that date, Atlas Corp. converted 30,000 shares into 182,750 shares of common.

Limited conversions by Atlas were further made when the 5⅛ shares of common for each share of preferred prevailed. As a result, Atlas Corp. now owns 42,959 shares of the total 43,451 now outstanding Northeast preferred. Atlas Corp. also owns 421,863 shares of Northeast common, or 50.3% of that issue.

• **Any current review** of outstanding airline convertible securities must include that of the Delta convertible debentures. Conditions surrounding convertible debentures are in many respects the same as for convertible preferreds. Debentures, however, representing a debt, technically give the holder a better position.

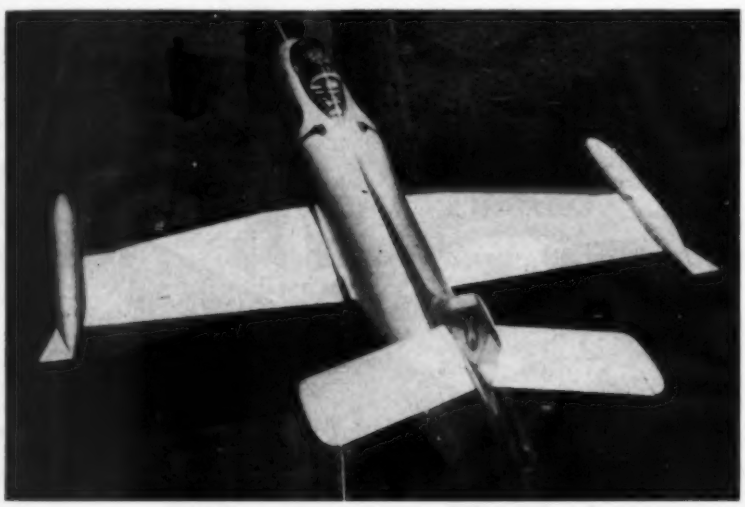
While the issuer of a convertible debenture may sometimes be reluctant to issue this type of security when a convertible preferred may succeed, the advantage does accrue to the corporation in that interest on debt is a tax deduction whereas dividends paid are not.

In acquiring Chicago & Southern Airlines in 1952, Delta issued $10,695,846 of its 5½% debentures with a scheduled maturity date of May 1, 1973. The conversion rate was set at $35 per common share, at that time substantially above the then current market price. After an indifferent market history, this issue sold as high as 120 this year.

Delta, on February 21, retired $2,500,000 of these debentures by call. This was soon followed by another call of $2,500,000 on July 25, and still another $3,000,000 on September 9, 1955. The latter two calls have resulted in conversions into common, but details are not now available.

The successful record of convertible preferreds (and debentures) in the airline industry, together with the prevailing popularity of this type of security in the general investment markets, may indicate their utilization in new airline financing that may be attempted. For a number of airlines, the acquisition of fleets of jets and related equipment years hence may necessitate some additions to capital funds.

• • •



Swiss Jet Fighter Prototype

P-16 SWISS JET FIGHTER prototype, developed and built by Switzerland's largest aircraft producer, Flug- & Fahrzeugwerke A. G., Altenrhein, under Swiss government contract. Equipped with an Armstrong Siddeley Sapphire, its special features are short landing and takeoff runs from airfields at considerable high altitude plus small turning radius. It features wings with very little sweep back but thin profiles and a small aspect ratio; a small sweep was chosen to counter the poor stability of the highly swept wing and to obtain high lift. On rear side of fuselage the P-16 has two large hydraulic operated dive brakes which at high speed develop a drag higher than the weight of the airplane. Large wing tip fuel tanks are not detachable.

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Signal System Cuts Turboprop Windmilling Drag

• Negative torque control is safety feature and pares fuel consumption.

By FRED S. HUNTER

NEGATIVE TORQUE SIGNAL SYSTEMS effectively dispose of the windmilling drag problem for turboprops, Lockheed Aircraft Corp.'s engineering flight test division reports.

"This is a bugaboo which has been completely dispelled by our flight tests," said R. L. (Rudy) Thoren, Lockheed's director of engineering flight test operations.

Lockheed has chopped the fuel in flight both on Allison 501 series engines and on Pratt & Whitney's T34s with eminently satisfactory results, according to Thoren.

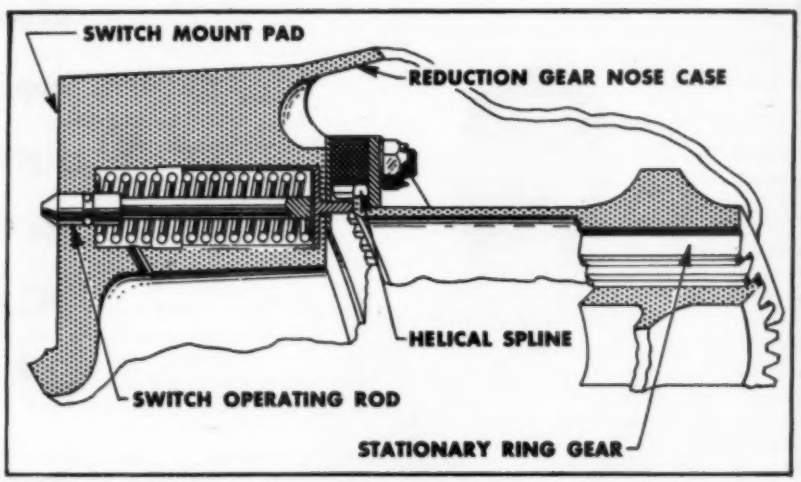
The Allison 501-D-13 engine is scheduled to power Lockheed's new commercial turboprop transport, the Model 188 Electra. Lockheed's C-130 cargo transports for the Air Force have the T56 military version of the same engine. T34s supply the power for the two experimental R7V-2 turboprop Super Constellations built by Lockheed for the Navy, and also two similiar YC-121Fs for the Air Force.

• **The Allison division** of General Motors calls its system NTS, meaning negative torque signal. P&W originally used the term ENTC (emergency negative torque control) but now calls it NTC, for short. In principle, the two work the same. In event of power loss, they move the propeller into high pitch and thus prevent it from creating the drag forces that could throw the airplane into violent yaw.

Windmilling drag came into sharp focus as a turboprop problem when the Navy lost a Douglas A2D in a test flight at Edwards Air Force Base in 1941. The aircraft, powered by an Allison T40 turning contrarotating props, went out of control from a power loss.

It is a normal function of the propeller—to hold its speed—that makes the trouble in event of fuel failure or loss of power. In its effort to drive the turbine and compressor, the prop goes into decreasing pitch. With the engine capable of absorbing very high horsepower, critical negative torque is an inevitable result unless measures are taken to block off the prop's travel to flat pitch.

• **Allison's approach** to this problem originally was to design a decoupler which would automatically disconnect the propeller from the gear box in case of trouble. From experience gained with its Convair Turboliner, in which it replaced the P&W R2800 reciprocating engines with two 2750 eshp T38 turboprops, including a decoupling incident in flight near El Paso, Tex., Allison developed an improved decoupler for the T56 for Lockheed's C-130.



NOSE OF REDUCTION GEAR in Allison's T56 turboprop mounts negative torque signal (NTS) system. It prevents buildup of propeller drag due to engine failure and voids possibility of runaway prop in event of governor malfunction.

Because of some misgivings about the decoupler, P&W was urged by Lockheed to develop a better device for the big T34 engines ordered by the Navy for the R7V-2s and by the Air Force for the YC-121Fs. Along with these bigger engines, which developed 5500/5700 eshp as compared to 3750 eshp for the Allisons, went bigger propeller blades—two feet in chord width—and the decoupler looked impractical.

At this stage, Rudy Thoren, together with engineers from Lockheed's aerodynamics division and Lon Storey, now chief project engineer on the Electra, worked up general requirements for a torque control or signal system and these were submitted to P&W. The Lockheed recommendations emphasized three main points.

• **First,** Lockheed told P&W it wanted a device of the utmost reliability to take over control of the propeller when the torque began to come from the propeller instead of the engine.

• **Second,** it wanted a device that would be independent of flight crew actions to eliminate the possibility of an operational error making it inoperative, and it had to be at a selected negative value to allow some propeller drag for normal landing operation.

• **Third,** make it possible to check it out on the ground pre-flight run, said Lockheed.

ENTC was the result.

The P&W device looked good to Lockheed, which then got together with Allison, the Air Force and Curtiss-Wright's propeller division on the development of a similar system for application to the T56 engines and the electric propellers with which the C-130s were to be equipped. In this spirit of cooperation, Allison developed NTS.

• **With a big stake** in the turboprop game, Lockheed worked closely with Allison all along the line, first conducting wind tunnel tests on the decoupling device, and then flight testing on its No. 1961 Constellation-type experimental airplane the original decoupler, NTS and the improved decoupler. No. 1961, incidentally, underwent quite a face-lifting to qualify for this project, including a double-skin fuselage and a new, stronger tail. Actually, Lockheed installed an R7V-1 tail on the plane.

Although NTS operates by directing the propeller to start toward feather and continue as far as necessary, it cannot drive the propeller into full feather and it is separate from the feathering system. On the C-130, feathering is manual. The Electra undoubtedly will incorporate automatic feathering for takeoff to meet CAA

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second segment climb requirements.

Allison's reworked decoupler will be available to backstop NTS in the Electra. It has now been tested in flight and can be set at or near the structural limits of the airplane to be triggered into its disconnecting action only in the event of a disaster-type mishap, like the blowing up of a turbine.

"The Electra," said P. A. Colman, Lockheed's chief preliminary design engineer, "is being designed to meet or exceed all safety standards of current transports." • • •

Rolls-Royce Takes Wraps Off Conway

By JAMES H. STEVENS

Long-awaited security release of Rolls-Royce Conway by-pass turbojet, type-tested in July at 13,000 lbs. static thrust, reveals a powerplant very similar to Avon RA-14 family.

Complexity, of which by-pass opponents accuse the concept, is not apparent externally. Double-ducting—by-pass air channel around second compressor, combustion zone, turbine and hot-jet tail pipe — is neat and made in four cylindrical bolted sections, apparently removable aft and not as half-shells.

Unofficially, it was reported that the Conway by-pass is 44 inches in diameter, exclusive of the generator, and 129 inches in overall length. Allowing for two-spool layout and probably seven-stage front and five-stage rear compressors, size would be about that of J57, perhaps a little longer but about the same diameter.

Rolls-Royce practice is to use as little steel as possible, but there is the additional weight of the by-pass ducting, thus weight penalty probably is about equal.

• **The by-pass concept** primarily is a two-spool turbojet and carries with it the same basic mechanical engineering problems — concentric shafting and multiple bearings. The shafting adds weight, makes assembly and disassembly more difficult, while the bearings, half of which have to be duplex, bring tricky cooling and lubrication problems.

It is not always realized that with pressure ratios of more than 6 to 1, the ambient air temperature inside the engine (before combustion) is above the flash point of most lubricants.

The special problem of the by-pass is aerodynamic — how much air to divert and how to do it. Upon leaving the front compressor (B) the air enters a diffusor-type annular settling duct (C), which will further raise its pressure, and is divided by a lip. First aerodynamic problem comes in here, since the flow must be stable under all conditions without "pumping" between second compressor (D) and by-pass — turbulence at this point could easily cause severe power losses.

• **The quantity** to by-pass air depends upon the envisaged airplane operating bracket, i. e. altitude and airspeed. The by-pass is a means of increasing total mass flow in the jet and reducing its speed so that there is less waste jet velocity (slip), thereby increasing propulsive efficiency.

Generally, the division will lie between 40% and 60% of by-pass, leaving enough air going through the second compressor to drive the two turbines and still have kinetic energy in the exhaust that will match the by-pass flow.

Secondary design problems are the provision of smooth internal and external by-pass duct walls, and the passing of fuel, cooling air and oil conduits across the duct without creating turbulence.

• **The final mixing** of cool/slow and hot/fast jets is a delicate aerodynamic problem. Inner and outer jet-pipe areas, particularly the amount of convergence, have to be adjusted so that the pressures are equal where they meet. The interchange of heat and velocity must then take place in a *common* jet pipe extension (G) before final exhaustion to atmosphere.

The point of mixing will be a considerable noise source, but it is internal, so final jet, being slower and cooler than that of straight jet of similar thrust, will be much less noisy. (Jet noise increases disproportionately with heat and velocity).

Addition of Rolls-Royce jet mufflers should make the Conway quieter than a plain turbojet of half its thrust.

Claims for the by-pass are:

• Low specific due to high propulsive efficiency, giving 5% range increase.

• Exceptional economy in high subsonic cruise conditions, 550-650 m.p.h.

• Improved takeoff and climb thrust, relative to turbojet, because of lower jet velocity.

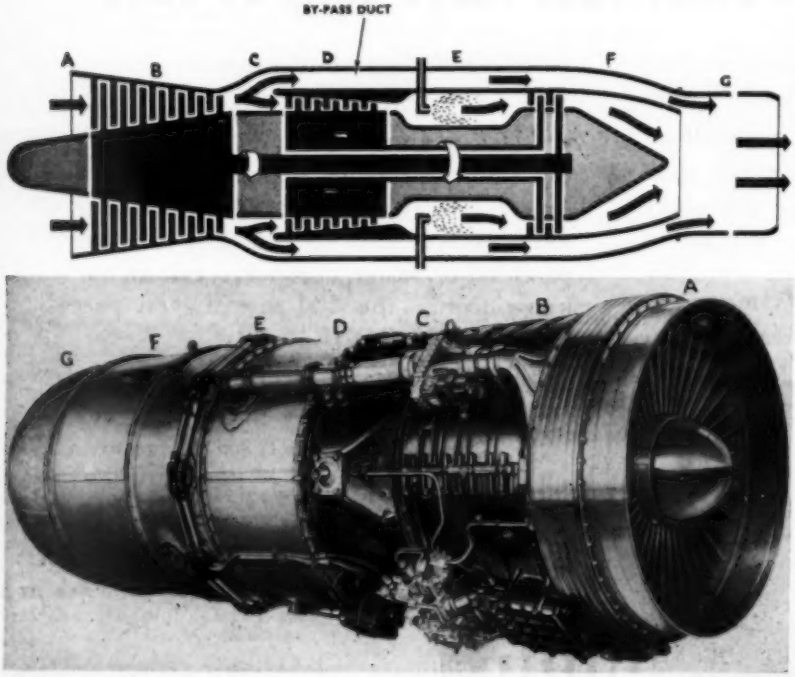
• Reduced fire hazard and heat radiation to airplane structure because hot end is isolated by cool air sheath.

• Quietness with high thrust.

• Large surplus of oxygen in relatively cool, slow jet means afterburning can be used at much higher thermal efficiency than with turbojet.

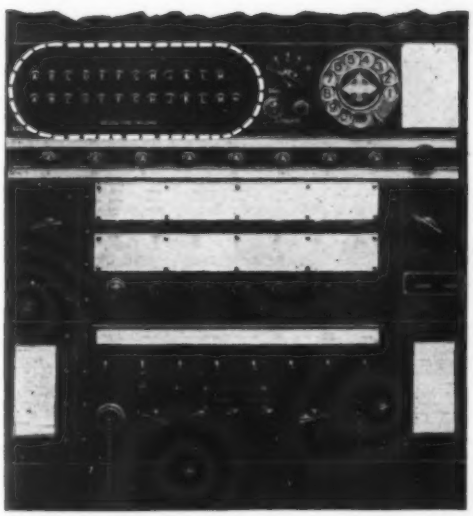
• Militarily, much reduced infrared radiation — Russians are known to have this form of detection developed from German original.

Against the by-pass are its size, weight, complexity, possibly narrower



CONWAY BY-PASS TURBOJET details. Various parts of the 13,000-lbs.-thrust Rolls-Royce engine are shown: (A) air intake and entry guide vanes; (B) front compressor; (C) diffusor and settling duct; (D) rear compressor zone; (E) combustion zone; (F) turbine and hot jet pipe; (G) mixing jet pipe.

ARINC SPECIFIES BENDIX* SELCAL FOR ITS INTERNATIONAL GROUND STATIONS



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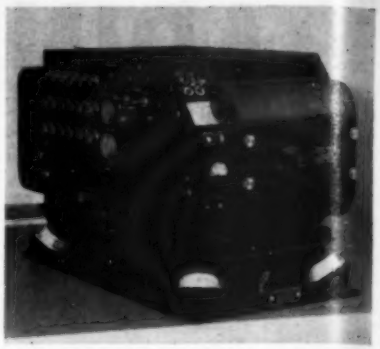
operating brackets — that is, the by-pass ratio may have to be altered to suit different airplanes, which means a basic engine characteristic change.

That development problems are extensive, requiring much empirical data from component tests, is shown by the 10 years or so taken by the vast resources of Roll-Royce to get the Conway on the bench.

In the same period other manufacturers have given up the by-pass in despair. Yet it is a very sound conception in theory—it was patented by Sir Frank Whittle 20 years ago — and was strongly supported by Rodwell Banks when he was responsible for engine development planning at the British Ministry of supply.

To sum up: the by-pass engine is a concept that can only be proven, or disproven, in flight service — and this responsibility rests squarely upon Roll-Royce.



TWO OF THESE CEC Type 5-114 oscillographs were aboard the F-100 and provided a record of the flight.

Oscillographs Yield Clues to Crash

NORTH AMERICAN AERODYNAMICISTS study oscillograph record that gave first real clue to cause of breakup of NAA's F-100.

Automatic measuring and recording instruments, which are coming into wider use in aeronautical testing work because of the complexity of testing and the rapidity with which measured conditions change, provided engineers with significant clues in the disintegration last October of an F-100 Super Sabre in which North American Aviation test pilot, George Welch, was killed.

A photographic record made by a recording oscillograph was one of the objects recovered from the wreckage, along with broken instruments and plane and engine fragments.

The test flight was the last in a series for F-100 No. 764. A long pull-up was scheduled. The last report from Welch came as he started his dive over the Mojave Desert. The aircraft disintegrated during the dive.

Because it was a test aircraft, it was rigged with many special recording instruments, including two Consolidated Engineering Corp. Type 5-114 recording oscillographs. All of these instruments were operating properly as the plane began to disintegrate.

Some of the most reliable clues to the probable cause came from the light-beam tracings on the oscillograph records. These tracings revealed actual control forces on the control stick and rudder pedals. They gave positions of the rudder, stabilizer, and ailerons at any given time in the performance of the test flight.

Here's what the engineers read from the tracings:

The pilot began his dive. In some freak action, the nose shot upward and to the right. Before Welch had time to get the plane under control, it went into a high, nose-right yaw and began to disintegrate.

Exact degree of yaw has not been revealed, but NAA engineers say it was considerable. The opposing forces resulting from the sudden change of direction, made while the plane was flying at extremely high speed, ripped the aircraft apart.

The yaw was recorded by the oscillograph and was confirmed by the last few frames of a movie camera film recovered from the wreckage which showed the sun's shadow on the plane's tail and gave engineers the attitude of the F-100 at the moment of disintegration.

Result was a new vertical tail for the F-100, changes to the wing tips and modification to the control system, including pitch and yaw dampers.

British Firm Opens Mach 3 Windtunnel

LONDON—The United Kingdom's most advanced windtunnel, a 10,000-hp Mach 3 facility at the Coventry missile plant of Armstrong-Whitworth Aircraft, has been opened to outsiders for the first time since the company started working on guided weapons five years ago.

The tunnel was designed under the direction of Armstrong-Whitworth's chief aerodynamicist, Dr. W. F. Hilton. It was built in a hangar at the Whitley plant that also houses the company's 5 ft. x 4 ft. low-speed tunnel and 10 in. x. 8 in. intermittent transonic (Mach 1.5) tunnel.

The three facilities have been grouped as the Windtunnel Division of Armstrong-Whitworth, which is a member of the Hawker-Siddeley Group.

CURTISS-WRIGHT
ROCKET POWER and the BELL X-2

The rocket engine that powers the new Bell X-2 is one more example of the advanced design concepts that have earned for Curtiss-Wright its leadership in the aircraft industry.

Exploring the problems of the "heat barrier" . . . where windshields melt and ordinary aircraft metals disintegrate . . . the X-2 employs a thrust equal to the power that drives a Navy cruiser at high speeds. Searing through the sonic barrier (yesterday's problem) and far beyond, it will gather data vital to America's future in the air. Its pilot will be able to throttle the engine up and down, for faster or slower speeds, and start or stop it . . . at will. He will select from a wide range of throttle positions . . . proportioning his fuel and controlling rocket thrust . . . another Curtiss-Wright *first* that makes rocket power practical for tactical aircraft.

Other advanced propulsion systems developed by Curtiss-Wright are powering leading airlines to new records as they go in service on latest re-equipment programs . . . are providing our air forces, and those of our allied nations, with long-awaited *bonus power* for today's spectacular developmental as well as operational aircraft. And there is more . . . much more . . . to come from Curtiss-Wright.

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Satellite Planning Calls for New Goals In Electronics

• Amount of instrumentation needed is undetermined, but possibilities pose new research and engineering problems.

By HENRY P. STEIER

How much, if any, electronic instrumentation will be carried by the first satellite vehicle to pierce the atmospheric curtain surrounding the earth? Neither the present state of electronics nor the rocket art seems to permit an answer at this time.

The elements of size and weight loom large as deciding factors in getting the most out of the first satellites planned to orbit around the earth sometime during the International Geophysical Year (IGY) that will run from July, 1957, to December, 1958.

Definite plans for a satellite, and a statement of some of the problems in connection with it, were first revealed by Dr. Joseph Kaplan, Chairman of the U. S. National Committee on the IGY, in a letter sent before President Eisenhower's public announcement to Prof. Sydney Chapman, President Comité Special de l'Année Geophysique Internationale (CSAGI) in Brussels, Belgium.

• The letter told Chapman that the resolution adopted by the International Scientific Unions in Rome on September 30, 1954, had been included by the U. S. as part of its participation in IGY. The resolution stated:

"In view of the importance of observations over extended periods of time of extraterrestrial radiations and geophysical phenomena in the upper atmosphere, and in view of the advanced state of present rocket techniques, CSAGI recommends that thought be given to the launching of small satellite vehicles, to their scientific instrumentation, and to the new problems associated with satellite experiments, such as power supply, telemetering, and orientation of the vehicle."

• Planned as a comprehensive study of the earth and its environment, the IGY program is best characterized by the interrelationship of observations to be made simultaneously in all parts of the world proceeding on a strict time schedule, accuracy of measurement and continuity of data to be collected. The satellites offer a possibility for extended observations in the fields of geodesy, atmospheric physics, ionospheric physics, auroral physics, and solar radiation.

The U. S., Dr. Kaplan said, "shall provide full scientific information on the orbiting vehicle so that other nations may monitor the device and make appropriate observations." The U. S. National Committee, he added, hopes the program will be "one of the greatest scientific achievements of our time."

Satellite electronics present to research and engineering new goals in miniaturization, weight reduction, and overall efficiency of instrumentation and telemetering design. Typical of most high altitude rocket projects to date have been the demands by participating interests that instrumentation carried be designed to serve their particular needs.

As one rocket instrumentation engineer told AMERICAN AVIATION, "Some people even want to measure the color of the rivets."

What would be measured if instrumentation is carried by the first satellites would be related to the orbit they describe and the permissible rocket payload. According to Dr. J. Wallace Joyce, head of the Washington Office of the National Science Foundation, various technical panels representing the community of scientific interests will receive suggestions on what is to be measured. They will then screen and tailor the suggestions to establish priorities on instrumentation, based on the payload to be carried and on the amount of the appropriation yet to be made by Congress for the satellites.

• A deciding factor in the instrumentation design is the importance of continuance observation of the regions in which the satellites orbit. Science, said Joyce, is interested in the "space relationship of the distributed conditions rather than the average." This means either continuous recording of data within the vehicle for transmission at given intervals or upon interrogation by a ground station, or continuous transmission to a number of ground stations over which the vehicle travels.

The electrical power supply problem stands a good chance of being overcome by using some arrangement of the Bell Laboratories Solar battery in the satellite. Efficiency of the battery has been doubled since its announcement last year. The batteries, of silicon and boron, and forming a p-n junction similar to that of the germanium diode, can now deliver up to 100 watts per square yard of silicon surface. Linked together, they offer the best available means of converting sunlight energy into electrical power for keeping a satellite supplied with power

PROPOSED ORBIT of the "Mouse" showing how it would scan areas of the world every 24 hours. Sixteen times per day the vehicle would pass over both poles on each 90-minute trip around the earth.

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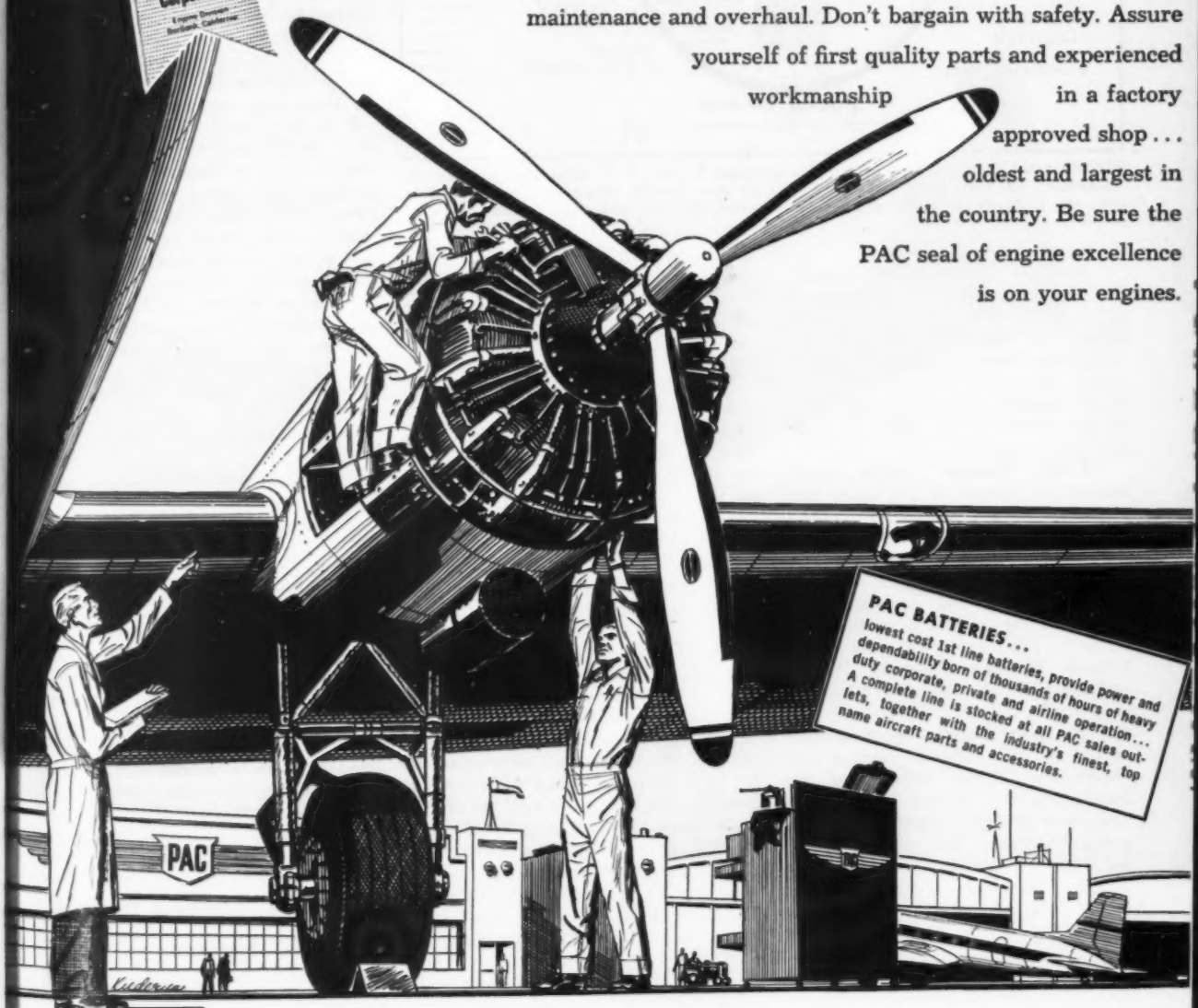

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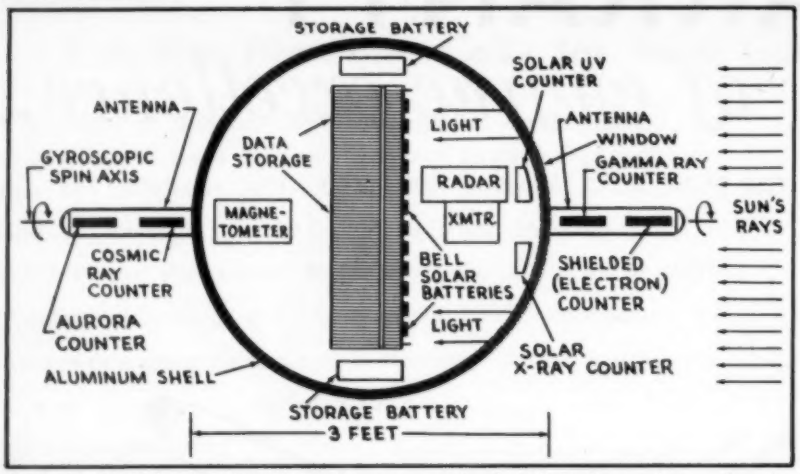

GENERAL PLAN for the "Mouse" satellite proposed by Prof. F. S. Singer. Larger than the "basketball" size now being considered, this spinning satellite would be gyro-oriented to solve the problems of electrical power supply from the sun, and antenna and instrument orientation.

for periods of days or weeks.

Satellites discussed by scientists thus far have been in terms of spheres of 14 to 20 inches. A 20-inch satellite whose one hemisphere was covered with Solar batteries would be able to recover about 50 watts from the sun. If the batteries occupied a cross-section of the sphere inside, about 25 watts would be available.

• **The "Bumper" rocket,** which reached an altitude of 244 miles, used a storage battery to supply its telemetering equipment. About 70 watts were needed. An ordinary vacuum type transmitting tube, type 2E26, was used to send velocity and deviation information to the ground at a frequency of 50 to 100 megacycles, according to General Electric's "Bumper Project" engineer R. P. Haviland. No transistors were used.

The Solar batteries were included as part of the "Mouse" satellite plan (Minimum Orbital Satellite of the Earth) proposed by Prof. S. F. Singer. They were to supply power to ordinary storage batteries. The orbit proposed by Singer is unique in allowing continuous observations of the sun. The orbit is perpendicular to the equator and to the line joining the earth and sun.

At an altitude of about 200 miles, and circling the earth every 90 minutes, the Mouse would traverse the whole range of latitudes. On each trip it would pass over both poles, and would always be over places at which the local time was 6 a.m. or 6 p.m.

• **Telemetering engineers** who discuss the satellite with AMERICAN AVIATION do not believe the FM/FM telemetering system used by the R & D Guided Missile Board would be altogether suitable for satellite application. The FM/FM system which compresses the transmission of many channels of information into a single channel, is said to have the advantage of rapidity but not of accuracy or power efficiency.

Missiles, with a life-time of only a few minutes, require a means of rapid transmission of many kinds of data. The use of binary registers in the form of magnetic core assemblies, similar to those used in the latest electronic data processing machines, would permit storage of observed data for short periods. The core "memories" are small in size and light in weight, and do not require much power.

A relatively new system of radio communication, called binary pulse code modulation, that requires small power but has wide bandwidth offering a high signal-to-noise ratio, has been under development by Bell Telephone Laboratories. Such a system was proposed by J. R. Pierce, Director of Electronic Research for Bell, to be used for orbital radio relays at altitudes of 2,000 miles.

Using such binary coded system, the satellite transmitter would send out short bursts information coded in terms of combined "0" or "1" signals. Power and equipment is thus shared among different types of instrumentation, and allows transmission of extremely accurate data.

• **In satellite communication,** the allowance for signal power losses need be slight, since the total mass of the atmosphere, looking at it vertically, is equivalent to about five miles of air at sea level, according to Pierce.

The demands placed upon electronics in the satellite will undoubtedly require complete reconsideration of data accuracy given by present rocket communication techniques. In his recent series of articles on the satellites, Willy Ley, among the foremost of experts on rocketry, said scientists do not expect any great surprises, that "a surprise finding would be paradoxically a great surprise." But, that scientists know only approximately things like the number of cosmic rays at the distance planned for the satellite. What they want the satellite to do, he said, "is to provide precise figures."

Orientation of the satellite, to keep the Solar batteries facing the sun, or to insure positive alignment of the antenna for reasons of directional transmission effects, would be accomplished in Singer's Mouse by pre-spinning the vehicle prior to its final release from the third stage rocket. The spin axis will be horizontal, and the gyroscopic effect would keep the sphere oriented without need for further control forces. Rotation might present a means of overcoming Solar battery heating problems caused by the sun, by permitting radiation of heat on the shaded side of the sphere during rotation.

Storage batteries produce gas, and the centrifugal force produced by a spinning satellite could prevent excessive foaming and agitation of the battery's electrolyte solution that might impare its operation.

• **The role of transistors** in satellites promises to be a major one. Like the magnetic core, the transistor is a current-controlled device well-matched to devices like magnetic core storage "memories," offering the same advantages of simplicity, durability and small size, together with its low voltage requirement.

Transistor oscillators that will handle substantial power are about to emerge from the laboratory. They seem likely to oust the vacuum tube from the position it has strongly held, power switching or oscillator applications necessary to provide the high voltage, direct current source necessary for radio transmitter operation, and now provided by heavy motor generators or vibrator supplies. • • •

Pan Am, United Install SELCAL System

A system of selectively calling specific aircraft is being added to the communications facilities of Pan American World Airways in its Latin American and Pacific Alaska divisions. United Airlines is installing the system fleet-wide (AMERICAN AVIATION, Aug. 29).

The system, developed jointly by Motorola and Pan Am, uses existing ground-to-air facilities. On the ground it employs Vibrasenders, vibrating reed mechanisms that generate a tone code

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All the missions of the Tactical Air Command have one thing in common: urgency! Whatever the need, TAC must answer it *fast*. That's why *mobility* is so vital.

Suppose the call is for paratroops. USAF's new C-130 Hercules, built by Lockheed, is the ideal paratroop transport. Look how the Hercules provides paratroop mobility:

64 fully equipped paratroops can run aboard four abreast on the rear-door ramp. In minutes the Hercules is loaded.

Up goes the ramp and, with turboprop power, the Hercules is airborne in seconds.

Flying faster than most commercial transports, and with great range, the Hercules gets where the paratroops are needed in a hurry. Inside, each paratrooper has his own seat, 2 feet wide. The cabin is pressurized and air conditioned, minimizing in-flight fatigue.

Two special side doors at the rear of the Hercules were designed for easier troop dropping. An effective wind-stream deflector and a unique floor extension make paratroop drops easier, faster and safer.

USAF's Hercules is now in production at Government Aircraft Plant No. 6 at Marietta, Ga., America's first turboprop production line for transports.

GEORGIA DIVISION

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AIRCRAFT CORPORATION

Marietta, Georgia

BIG NEW LIFT FOR AIR TRANSPORT

Production rolling on New Allison Turbo-Prop-powered Lockheed C-130 Hercules

AMERICA's first production Turbo-Prop transport – the Lockheed C-130 Hercules – is coming off the lines of Government Aircraft Plant No. 6 in Marietta, Georgia, in growing numbers.

Powered by four Allison T56 Turbo-Prop engines with a total of 15,000 horsepower, this new cargo plane can carry some 20-ton payload long distances *at amazingly low operating cost.*

With its exceptional power-to-weight ratio, the Hercules can take to the air at a 30 degree angle after a ground run of less than a thousand feet, considerably less than other planes of comparable size. Its low fuselage floor, 41 inches off the ground, provides truck-bed loading, while the adjustable tail ramp also permits vehicles to drive directly aboard.

Developed for the Tactical Air Command, the Hercules is a highly mobile, high-speed transport, able to rush men and materiels to advanced areas and evacuate wounded.

The Allison Turbo-Prop engine which powers it is the first Turbo-Prop to receive CAA certification for commercial use–a promise of early application in peacetime commercial passenger and cargo service.

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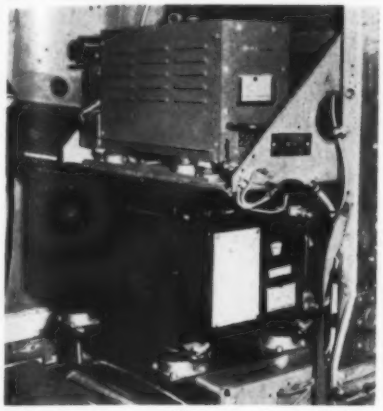

to interrogate specific aircraft. A Vibrasponder, carried by a plane in its Motorola SELCAL equipment, responds to the signal and alerts the crew through either a light or a buzzer signal. The system makes it unnecessary for the crew to constantly monitor airways channels to intercept an occasional message directed to their aircraft.

Two types of units are available. A single decoder system monitors a single radio channel. A dual decoder system monitors two receivers.

Military organizations are evaluating dual decoders. By using different codes in each of the decoders in a dual unit, a group call as well as a specific plane call is possible through attachment to a single radio receiver.

Electronotes

• **General Electric Co.** is expanding its receiving tube plant facilities at Owensboro, Ky. A new plant with 112,000 square feet will house engineering development and warehouse facilities. Production of high reliability miniature and sub-miniature receiving tubes will continue to be the main effort at Owensboro.

• **Compulsory use** of distance measuring equipment began in Australia on June 1, 1955. A total of 68 D.M.E. ground stations has been alloted for the major national air routes. The Australian D.M.E. is reported to have a range of 100 nautical miles, with an accuracy of 2% at long range, and at ten miles the error does not exceed 350 yards. The ground beacons have positive identification. More than 50 aircraft can use the same beacon at one time.

• **Aerovox Corp.** has announced a wider choice of base materials for its printed-wiring process. Materials ranging from cloth-base phenolics, Teflon glass, Nylon-base phenolic, to Polystyrene offer solutions to the problems of high frequency, high temperature, weight reduction, and high strength.

Military Combat Team Maneuvers

20 TOUGH GUYS IN A HURRY

General Forrest would have loved the Piasecki H-21 helicopter. It "gits thar fustest with the mostest men." Twenty heavily armed men can be transported from advanced air fields direct to combat areas.

Not only troops, but other material can be hauled by the H-21 workhorse. It's capable of carrying loads over two tons and has been especially designed to perform a wide variety of rugged military and commercial tasks.

The tandem rotor arrangement, with its inherently powerful control system, permits operation under many and varied conditions. Whether used in the tropics or the mountain areas in the North, the H-21 is recognized for its speed, range, lifting power and ease of maintenance.

For rapid cargo transport, large trucks can be unloaded directly into the cabin through two doors without stopping rotors.

This new carrier is just another result of Piasecki Helicopter Corporation's unceasing effort to improve helicopter performance — to build helicopters to do more jobs and do them better than ever before.

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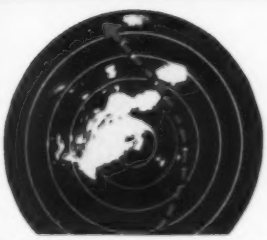
Simplicity, light weight, efficiency and dependability are the reasons for this preference

More and more leading air lines are equipping their ships with RCA's new weather-mapping radar. Their choice has been based upon exhaustive comparisons.

RCA's AVQ-10 is the first airborne radar to use C-Band (5.6 cm) transmission, the wave length most suitable for "looking into" storms, yet having the least amount of scope clutter. It presents the pilot with an easily-interpreted display of storm conditions around him. In addition, it gives the pilot valuable ground-mapping information.

In terms of time saving and increased passenger comfort, the RCA AVQ-10 weather radar is more and more becoming a "must" among air lines. With it, pilots can "see" into storm areas many miles ahead and pick non-turbulent paths between them, often making long and costly detours unnecessary.

RCA is proud that these distinguished air lines have chosen the AVQ-10 to save time and increase passenger comfort. Every effort will be made to meet additional commitments occasioned by the great and growing demand for this equipment. To assure early installation, other air line and private operators are invited to write immediately for further particulars on the RCA AVQ-10. Overseas customers should get in touch with the RCA International Division, 30 Rockefeller Plaza, New York City, or any RCA International Distributor.



Dotted line shows how airplane passed between storm cells in its flight path.

Minutes and miles are saved when a pilot is able to find a smooth path through turbulent areas.

AVQ-10 antenna mounted in nose of airplane scans the forward areas, enabling the pilot to evaluate storm conditions far ahead.

RCA Tmks ®

COMMERCIAL AVIATION SALES
RADIO CORPORATION of AMERICA
ENGINEERING PRODUCTS DIVISION *CAMDEN, N.J.*

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NEW AUDIO AMPLIFIER

New! A Practical Audio Amplifier for cockpit & cabin speakers at a practical price. Weighs only 2¾ lbs. less shockmount. Call, write or wire today. Immediate delivery.

SPECIFICATIONS
8 W. with 2% Distortion
Output Impedance: 4, 8, or 16 ohms
Low Volt. Input: 28 V.D.C. @ .5 amp or 14 V.D.C. @ 1 amp
Hi-Volt. Input: 115 V, 400 cycle or 275 V.D.C. @ 90 amp.
Size: 6½" x 3¾" x 4"

AVIATION ACCESSORIES

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Engineering Versatility

If you enjoy diversified assignments, check your opportunity with Fairchild. We're looking for engineers experienced in

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to analyze and develop practicality of all types of aircraft metals.

Write our EMPLOYMENT MANAGER

ENGINE AND AIRPLANE CORPORATION

FAIRCHILD

Aircraft Division

805 PENNSYLVANIA AVENUE
HAGERSTOWN, MARYLAND

New Products and Processes

UNIVERSAL HARNESS TESTER

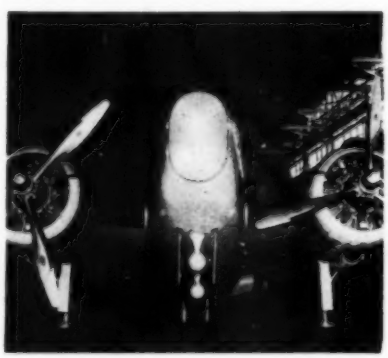
Greer Hydraulics, Inc. has developed a universal harness tester designed to provide a quick, accurate check of continuity, insulation resistance, interlead shorts and shorts to ground in electrical control harness of turbojet engines.

The unit consists of a low and high voltage test circuit, switches and controls for applying these potentials to the cable being tested, and lights that indicate proper or faulty operation. Controls and indicating lights are mounted on an insulated instrument panel. On the back of the console is a plug panel for connecting the harness.

The tester may be plugged into any 110-volt, 60-cycle, single-phase power source.

Circle No. 164 on Reader Service Card.

THIN-WALL RADOME



A thin-wall radome suitable for both X-band and C-band use is offered by the Chamberlain Aviation Corp. Made of multiple-ply fiberglas cloth, the Chamberlain radome is hinged to the forward fuselage section, allowing quick and easy access to the nose compartment.

The radome is supplied with all installation parts, drawings, detailed instructions for installation and specific performance data on the radome itself.

Chamberlain radomes are presently available for Douglas DC-3 type planes and Lodestars, but other units are expected to be available shortly.

Circle No. 162 on Reader Service Card.

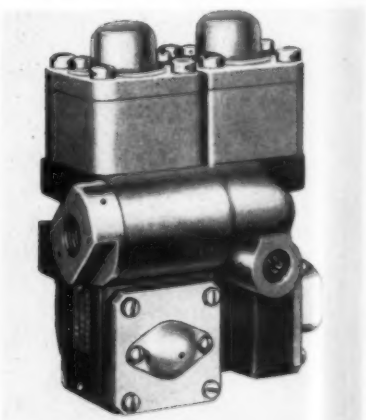
GROUND SERVICE COUPLING

E. B. Wiggins Oil Tool Co. has developed a hot-air ground service coupling for aircraft ground support gas turbine compressors. Designed to Air Force specifications, it is intended to fit specific coupling needs.

Design criteria include low-pressure, high-flow compressed air couplings by both remote and local actuation, interchangeability and adaptability through a wide selection of installation and hose fittings, and rugged construction.

Circle No. 165 on Reader Service Card.

PRESSURE REGULATORS



Aro Equipment Corp. has announced three new products for aircraft: an absolute pressure regulator (shown), a pressure regulator and a pressure relief valve.

The absolute pressure regulator, designated Model 12275, is used for controlling the absolute pressure in elec-

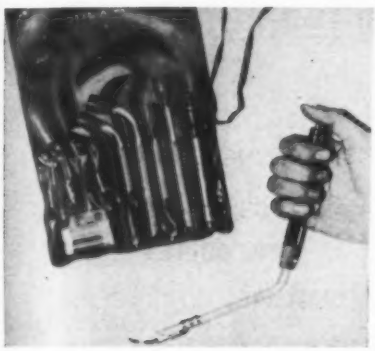
tronic equipment containers. It is also suitable for other aircraft applications in which absolute pressure must be maintained within close limits.

The Model 13200 pressure regulator provides regulated compressor bleed to external fuel tanks. It operates without overboard bleed and sustains 11 Gs applied in any direction.

Pressure relief valve Model 13300 is used for maintaining external fuel tank pressure within required limits. It is suitable for use with dry air.

Circle No. 169 on Reader Service Card.

INSPECTION LIGHT



An inspection flashlight that bends light around corners by means of a light focusing rod and a magnifying mirror is offered by the F. T. S. Corp.

Trade named S,te Ayde, the flashlight comes in a kit with four detachable lucite rods and three detachable angle-form mirrors. It enables the user to examine areas otherwise inaccessible or difficult to see. According to the manufacturer, it is especially useful for tool and die makers, die setters, set-up men, molders, general maintenance and repairmen, parts inspectors and others.

Circle No. 168 on Reader Service Card.

SEALED SWITCH

Micro Switch, a division of Minneapolis Honeywell Regulator Co., has developed a sealed, cylindrically-shaped switch especially for the aircraft industry.

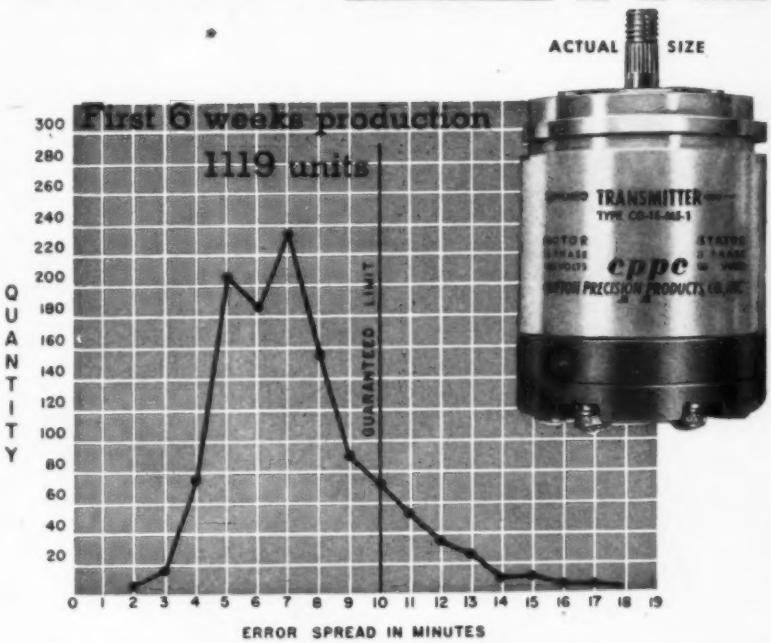
Measuring 1 in. in diameter and 2

CLIFTON PRECISION OFFERS A SIZE 15 SYNCHRO TRANSMITTER

identical to BuOrd type 15CX4a

Except

ACCURACY SPREAD GUARANTEED 10′ or LESS



The CG-15-MS-1 transmitter is interchangeable part for part with the U.S. Navy Bureau of Ordnance type 15CX4a synchro transmitter (Mark 22 Mod. 1) in every respect.

Because of quality workmanship in this unit we are able to guarantee accuracy spreads not to exceed 10′. From the chart it will be noted the majority of production units have error spreads between 5′ and 8′—yet price remains exceedingly low.

Stainless steel bearings are provided for better environmental resistance.

FOR SALES INFORMATION, CONTACT:

New England: The Darbury Corp., 99 Elm St., W. Newton 65, Mass.
Southwest: Ammon & Woods Asso., 4163 Glenwick Lane, Dallas, Tex.
West Coast: Enright Engineering Co., 988 W. Kensington Rd., Los Angeles
Home Office: T. W. Shoop, Sales Mgr., Telephone (Phila.) MAdison 6-2101

LOOK TO CPPC FOR SYNCHRO PROGRESS

CLIFTON PRECISION PRODUCTS CO. Inc.

CLIFTON HEIGHTS
PENNSYLVANIA

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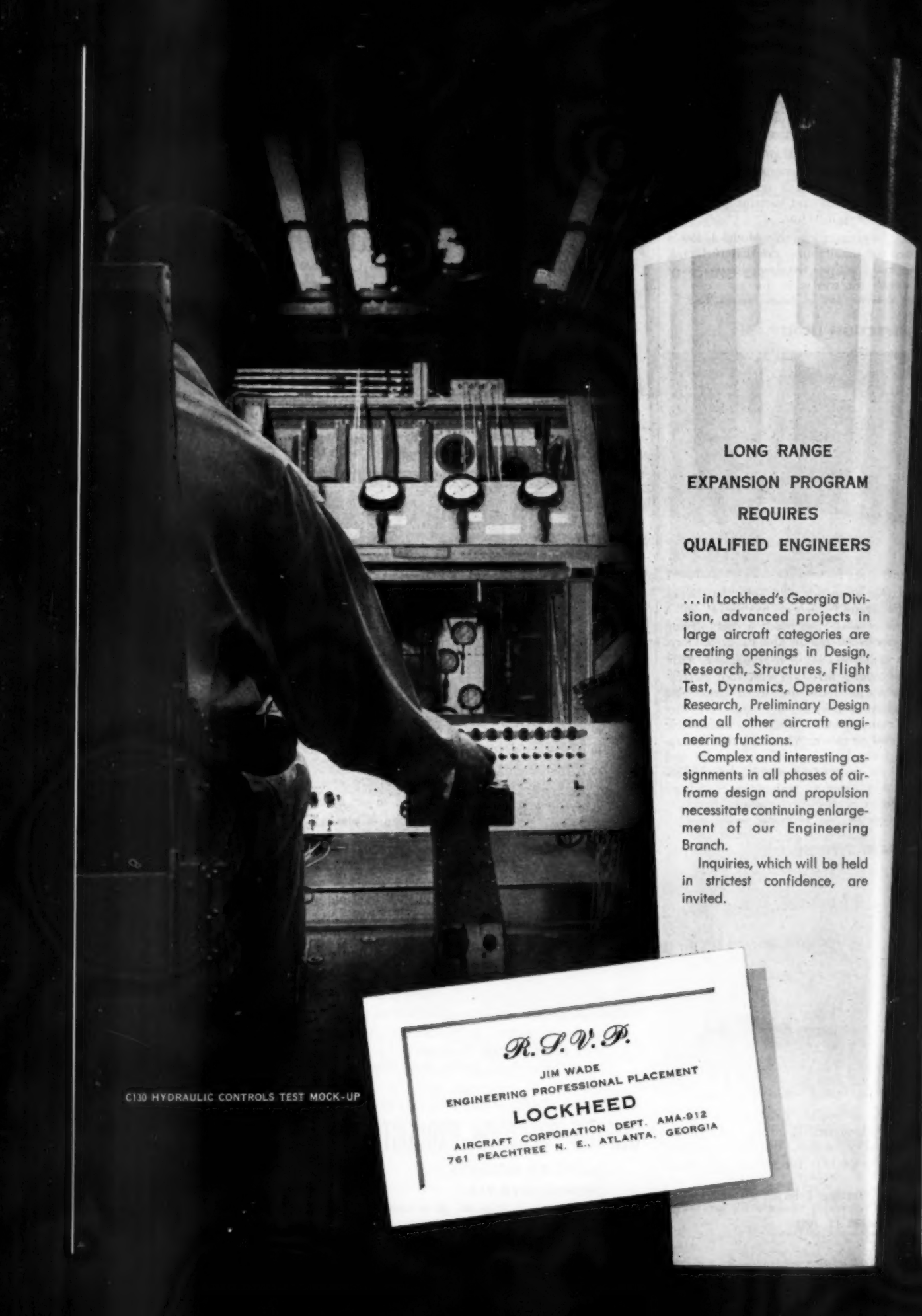

C130 HYDRAULIC CONTROLS TEST MOCK-UP

LONG RANGE EXPANSION PROGRAM REQUIRES QUALIFIED ENGINEERS

...in Lockheed's Georgia Division, advanced projects in large aircraft categories are creating openings in Design, Research, Structures, Flight Test, Dynamics, Operations Research, Preliminary Design and all other aircraft engineering functions.

Complex and interesting assignments in all phases of airframe design and propulsion necessitate continuing enlargement of our Engineering Branch.

Inquiries, which will be held in strictest confidence, are invited.

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JIM WADE
ENGINEERING PROFESSIONAL PLACEMENT

LOCKHEED

AIRCRAFT CORPORATION DEPT. AMA-912
761 PEACHTREE N. E., ATLANTA, GEORGIA

These Combat Twins can score a smash hit!

REPUBLIC'S F-84 "THUNDER TWINS"— TWO MORE VITAL MILITARY AIRCRAFT WITH MAJOR COMPONENTS by **TEMCO**

These twins complement each other ideally. Thunderflash, the photo reconnaissance twin in the foreground, locates the targets. Thunderstreak, the A-bomb carrying fighter-bomber, smashes same. Designated RF-84F and F-84F, these combat twins are two of the Air Force's most versatile planes. In addition to their regular missions, the Thunderflash has a special assignment. It has been equipped to be carried kangaroo fashion in the belly of a B-36 and launched or retrieved in the air. Thus, fighter speed over the target is coupled with bomber range — a formidable combination. Republic keeps production schedules smooth on these planes by subcontracting several assemblies, including rear fuselage sections of both, to TEMCO. Work on these vital planes is reinforcing TEMCO's well established reputation for producing a quality product, on schedule, at one of the lowest costs in the industry.

Thunderstreak and Thunderflash rear fuselage sections nearing completion on TEMCO assembly lines.

ENGINEERS . . . If you are interested in a position with a *growing weapon systems organization*, write full particulars to E. J. Horton, Jr., Engineering Personnel, TEMCO Aircraft Corporation, P. O. Box 6191, Dallas 2, Texas.

TEMCO
AIRCRAFT CORPORATION
DALLAS, TEXAS

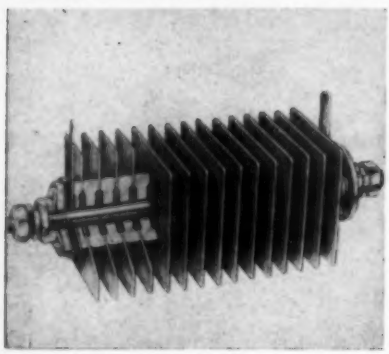
NEW PRODUCTS

in. high, the 1EN1-6, as it has been designated, has two single-pole, double-throw switching units sealed within the can-shaped metal housing. To insure constant operating characteristics regardless of atmospheric change, the housing is evacuated and filled with inert gas under pressure.

An unusual feature of the switch is an ice-scraper at the base of the actuator, for removing mud or ice that might collect on the plunger.

Circle No. 155 on Reader Service Card.

SELENIUM RECTIFIERS



Rated in accordance with the latest NEMA-approved specifications, a new line of selenium power rectifiers is being produced by Union Switch and Signal-Division of Westinghouse Air Brake Co.

Said to be especially suitable for laboratory, radiation detection and guided missile applications, the rectifier cells range in size from 1 x 1 inches to 5 x 6 inches and are rated from 0.180 to 10.0 amperes per cell on a single-phase full-wave bridge basis. Bolt, bracket, stud or eyelet construction is available.

Circle No. 151 on Reader Service Card.

FIRE CONTROLS

A new line of fire emergency controls that are said to conform with the latest thinking concerning cockpit standardization has been developed by Avionic Products Engineering Corp. According to the manufacturer, these controls prevent confusion by indicating fire as well as showing which handle to pull.

Model E601, shown at left, has detent action. Model E801, right, has over-center action for an operating force of between 8 and 10 lbs. Controls have T-shaped plastic knobs containing two separate red filtered warning lights that cause the knob to glow red when fire occurs.

Circle No. 156 on Reader Service Card.

RESTRICTOR VALVES

A new line of restrictor valves for 3,000-psi hydraulic service has been announced by Aircraft Products Co.

Series 1100 valves are available in either fixed two-way or one-way types, with either internal or external threaded ends. They are said to have a wide ambient temperature range and weigh 20 to 35% less than conventional models.

The fixed two-way type contains a fixed orifice in the center and .008-in. mesh filters on either side. It provides precise flow metering in both directions. The fixed one-way type meters in the restricted flow direction and permits full line flow at low pressure drop in the free flow direction. It contains an orificed poppet with an integral filter.

Circle No. 167 on Reader Service Card.

REFERENCE JUNCTION

Thermo Electric Co. has announced a reference junction for thermocouple circuits that permits the measurement of temperatures with the same strip chart recorder, thus eliminating the need to use a separate pyrometer.

The basic principle of the unit involves the maintenance of a constant, predetermined temperature at the thermocouple circuit reference junction, regardless of variations in the ambient temperatures. A high-sensitivity thermostat operates a relay that meters electric power to a constant-temperature zone heater.

The reference junction can be introduced at any point in the thermo-

To the ENGINEER of high ability

AiResearch is looking for your kind of engineer. Through the efforts of engineers like yourself our company has become a leader in many outstanding aircraft accessory fields. Among them are: air-conditioning and pressurization, heat transfer, pneumatic valves and controls, electric and electronic controls, and the rapidly expanding field of small turbomachinery. AiResearch is also applying this engineering skill to the vitally important missile accessory field.

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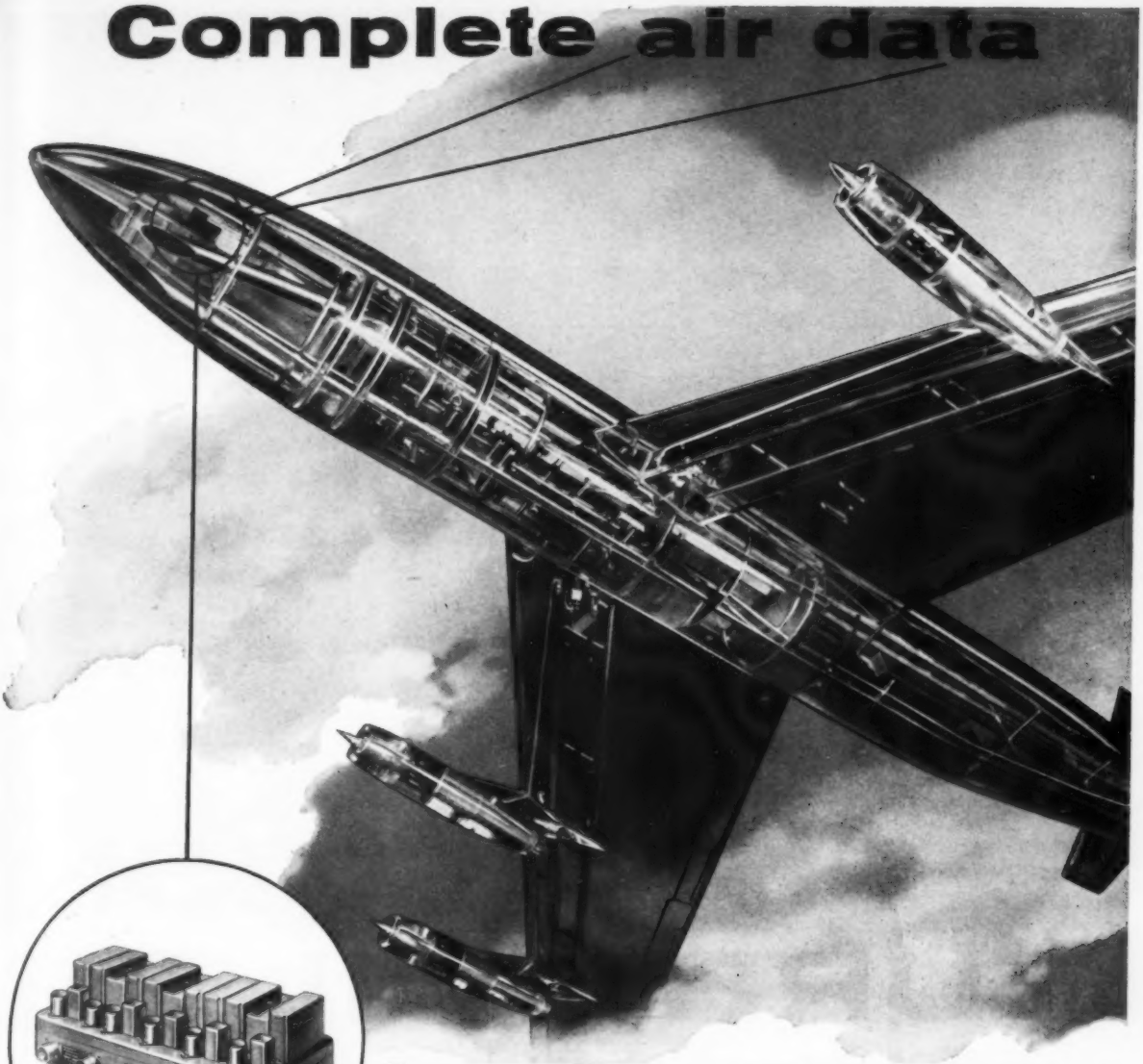
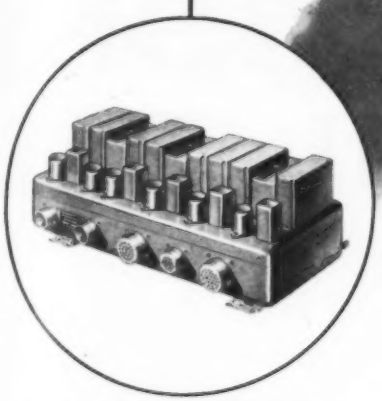
For further information write today to Mr. Wayne Clifford, THE GARRETT CORPORATION 9851 S. Sepulveda Blvd., Los Angeles 45, California. Indicate your preference as to location between Los Angeles and Phoenix.

THE GARRETT CORPORATION

AiResearch Manufacturing Divisions

Complete air data





CENTRAL AIR DATA COMPUTER
BRAIN OF THE AIRESEARCH SYSTEM

Complete system functions include providing true airspeed, true angle of attack and yaw, relation to Mach number, density and rate altitude, engine pressure ratio, true dynamic and static pressure, cruise control and other factors.

in one system

Here is a system that provides for the most efficient aircraft operation. It supplies all pertinent air data information to the flight engineer and pilot, or automatically makes in-flight adjustments. Similar systems are available for missiles. The air data computer system is one of many integrated systems completely engineered and manufactured by AiResearch. In the field of aircraft systems and integrated components, AiResearch has more development, manufacturing, operational and service experience than any other company.

• Qualified engineers in the fields listed below are needed now. Write for information.

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Designers and manufacturers of aircraft systems and components: REFRIGERATION SYSTEMS • PNEUMATIC VALVES AND CONTROLS • TEMPERATURE CONTROLS CABIN AIR COMPRESSORS • TURBINE MOTORS • GAS TURBINE ENGINES • CABIN PRESSURE CONTROLS • HEAT TRANSFER EQUIPMENT • ELECTRO-MECHANICAL EQUIPMENT • ELECTRONIC COMPUTERS AND CONTROLS

Circle No. 21 on Reader Service Card.

ESSO AVIATION TURBO OIL 35

ONLY OIL APPROVED FOR LUBRICATING VICKERS VISCOUNT TURBO-PROP ENGINES

An exclusive Esso achievement... Esso Aviation Turbo Oil 35, a synthetic product, is the *only* gas turbine lubricating oil approved by Rolls-Royce, makers of the four "Dart" turbo-prop engines powering the Viscount "700" Series.

Only a *synthetic* lubricating oil can meet all the exacting requirements of these turbine engines; they cannot be met completely by a mineral oil, even of the highest quality.

This is another Esso "first," result of technical *research* and *foresight* on the part of Esso aviation lubrication specialists working in close cooperation with British and U. S. aircraft engine designers and builders.

All of these airlines rely on
Esso Aviation Turbo Oil 35
for propeller turbine engine lubrication of their Vickers Viscounts, the first and still the only turbo-prop aircraft in scheduled service:

- British European Airways
- Air France
- Aer Lingus
- Trans-Australia Airlines
- Trans-Canada Air Lines
- Capital Airlines
- British West Indian Airways

Esso

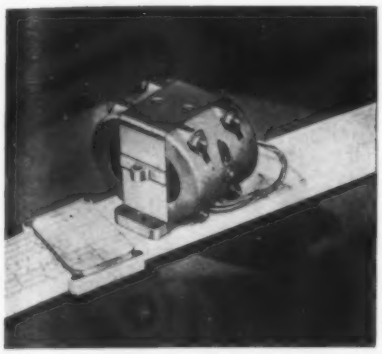
INTERNATIONAL AVIATION PETROLEUM SERVICE

NEW PRODUCTS

couple circuit, according to the manufacturer.

Circle No. 161 on Reader Service Card.

GRAPHIC RECORDER

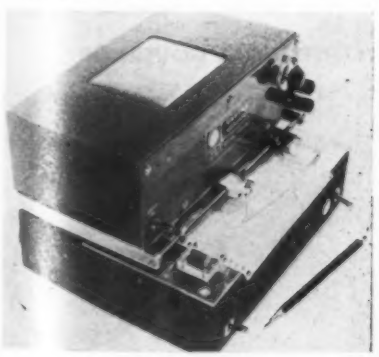


A new 15-lb. Model G-10 graphic recorder made by Varian Associates is said by the manufacturer to be the first low-cost instrument of its kind for dependable recording of scientific phenomena.

This recorder may be used as a recording millivoltmeter or, with appropriate transducers, as a means of recording pressure, light intensity, temperature and other physical quantities. Of the self-balancing potentiometer type, the instrument has a full-scale response time of 2.5 seconds and a sensitivity of 100 millivolts. Accuracy is said to be 1% and allowable signal source resistance 0.5 megohms.

Circle No. 150 on Reader Service Card.

TORQUE MOTOR



A torque motor designed to drive hydraulic servovalves or other mechanisms that demand fast response and high output has been announced by Raymond Atchley, Inc.

Weighing only 18 oz., the Model 21 torque motor is rated at 9 lbs. of force or 40 ma differential output. It may be driven from two miniature output tubes in push-pull, or from magnetic amplifiers.

The stroke of the motor (± .015

Bendix Products Division

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Sounds like a lot to promise, but, if you will get in touch with your nearest Bendix Distributor, he will be glad to demonstrate just how the program works. *TRADE-MARK

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Struts, wheels, brakes and Cerametallic brake lining.

Injection and float-type carburetors, direct fuel injection systems.

THE NAME Bendix AVIATION CORPORATION MILLIONS TRUST

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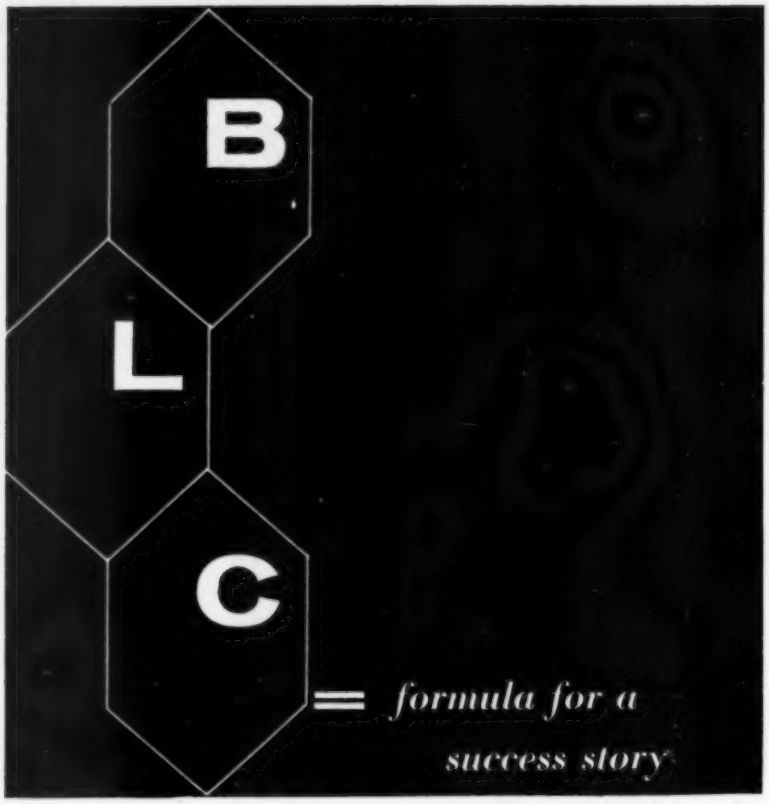

This is a call for specialists: Aerodynamicists who have worked in Boundary Layer Control and who can make genuine contributions to the research now being conducted at Fairchild.

Since 1951 Fairchild has led a pace-setting study program in problems of Boundary Layer Control and now there are a few openings for men who are sincerely interested in seeing their own ideas about BLC realized and developed.

Fairchild, who are producing such world-famous aircraft as the C-119 *Flying Boxcar* and C-123 *Provider*, are planning now for the preparation of transports, fighters and missiles as well as VTO craft. It is in this vital new program that BLC specialists will find stimulating, challenging, profitable work.

Plan to realize your ambitions in this progressive, fast-growing organization. Living conditions are superb in Maryland's attractive Cumberland Valley, where housing, schools and recreational facilities are among the nation's finest. And, working conditions at Fairchild are excellent — good salary plans, paid pensions, health, hospitalization and life insurance are just a few of the outstanding company benefits.

Send your resume today to Walter Tydon, Chief Engineer. All correspondence will be kept in strictest confidence.

"where the future is measured in light-years"

ENGINE AND AIRPLANE CORPORATION
FAIRCHILD
Aircraft Division
HAGERSTOWN, MARYLAND

NEW PRODUCTS

in.) is proportional to input differential current. Displacement sensitivity is ¾ in. per ampere, or 20 ma for full stroke. The motor is assembled with steel dowels and is said to be able to withstand severe vibration without damage.

Circle No. 166 on Reader Service Card.

MAGNETIC NULL INDICATOR

A portable measuring instrument said to be many times faster than moving-coil type galvanometers has been developed by Doelcam, a division of Minneapolis-Honeywell Regulator Co.

Known as a magnetic null indicator, the instrument performs both dc null detection and linear deflection measurement. Its chief features are its low noise level, said to be less than 2 microvolts, and its high stability, a zero drift of less than one division per hour.

The indicator, housed in a case measuring 7 x 8 x 12 in., weighs only 16 lbs. Input terminals are completely isolated from the chassis and the circuit ground of the instrument.

Circle No. 163 on Reader Service Card.

CENTRIFUGAL GOVERNOR

A miniature centrifugal governor, designed for use with fractional hp motors operating on 30 volts dc or 110 volts ac, is being manufactured by Nader Mfg. Co.

The governor is made of metal and non-hygroscopic materials and therefore is unaffected by fungus or humidity.

new Boeing jet tanker to stretch America's Air Arm with mid-air refueling

Almost daily, continuous flights halfway around the World are being made because huge KC-97 tankers meet bombers for refueling in mid-air. Tankers like the Boeing KC-135 will bring "targets" on faraway Continents within striking distance. The new Boeing KC-135 will haul extra large cargoes because *added strength* with *less weight* is possible with metal honeycomb construction. Kawneer is helping build more planes like the KC-135 *faster* because of excellent metal bonding facilities to produce any kind of honeycomb assembly. Our experience in metal bonding honeycomb will be helpful to you in designing new applications of this material. This is another example of how you can benefit by Kawneer's integrated engineering and manufacturing service.

Kawneer will produce the ailerons for the KC-135 utilizing honeycomb sandwich construction

Illustrated here is the Boeing 707 Tanker-Transport prototype of the new KC-135.

Learn more about Kawneer's Slogan– "Quality products– Economically produced– Delivered on time" *Write for this book*

Kawneer
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Gentlemen:
Please send us .... copies of your new descriptive book to distribute to our key men.

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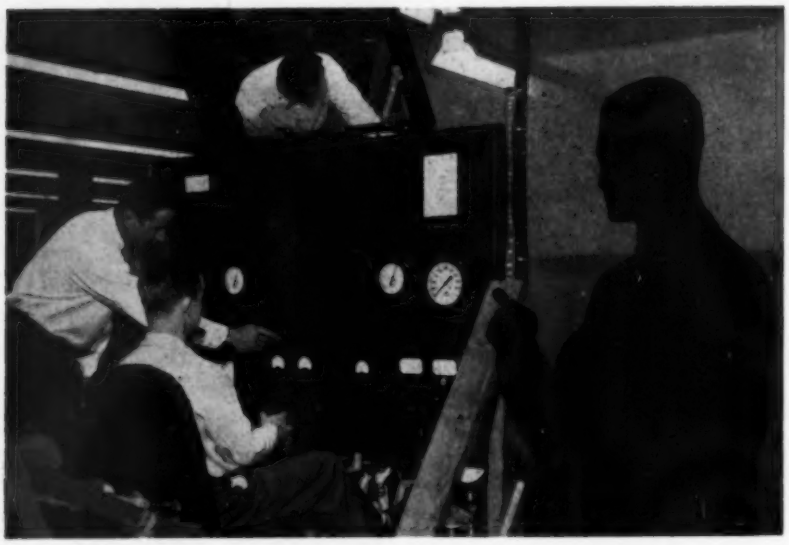
TO THE FINE ENGINEERING MIND
SEEKING THE CHALLENGING PROJECTS IN



CONTROL SYSTEM DESIGN

CONTROL SYSTEM DESIGN ENGINEERS will find exceptional career opportunities now at Convair in beautiful San Diego, California. Men with understanding of dynamic performance design criteria and capability of translating these criteria into actual hardware design through design analysis and integration are especially needed. Included are engineers with backgrounds in *Dynamic Analysis, Electronics, Servomechanisms, Hydraulics, Stability Augmentation Systems,* and *Automatic Flight Control Systems.* Projects will embrace (1) Establishment of design requirements working from performance criteria (2) Control system operational evaluation (3) Control system design analysis and synthesis (4) Organization of control system test programs (5) Reliability studies of systems, sub-systems and components and (6) Component evaluation. Unusual opportunities also exist for Control System Design Engineers experienced in control system design integration with related items of equipment such as Fire Control, I.L.S., Automatic Navigation and Automatic Landing Systems.

CONVAIR offers you an imaginative, explorative, energetic engineering department to challenge your mind, your skills, and your abilities in solving the complex problems of vital, new, immediate and long-range programs. You will find salaries, facilities, engineering policies, educational opportunities and personal advantages excellent.

Generous travel allowances to engineers who are accepted. Write at once enclosing full resume to:

H. T. Brooks, Engineering Personnel, Dept. 209

CONVAIR

A Division of General Dynamics Corporation

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SMOG-FREE SAN DIEGO, lovely city on the coast of Southern California, offers you and your family a wonderful new way of life... a way of life judged by most as the Nation's finest for climate, natural beauty and easy (indoor-outdoor) living.

NEW PRODUCTS

Contacts open when a pre-set speed is exceeded, shutting off the power. When speed drops below the set valve, the contacts close.

Governors are factory-set to regulate at any one desired speed, from 6,000 to 21,000 rpm.

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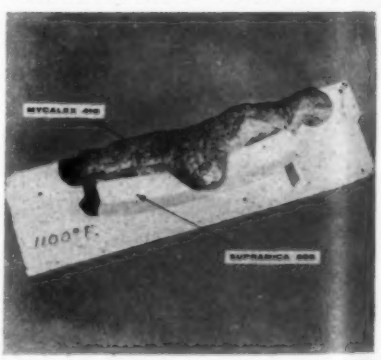
POWER TETRODE

A new bantam convection and forced-air-cooled radial-beam tetrode for modulator, oscillator, amplifier, or frequency multiplier application is available from Eitel-McCullough Inc. Featuring easier cooling, a new cathode design, and increased plate dissipation of 250 watts, the Eimac 4X250B tube will deliver up to 300 watts of useful power at 400 mc.

Circle No. 152 on Reader Service Card.

'CERAMOPLASTIC' INSULATION



Mycaflex Corporation of America has developed a new "ceramoplastic" electrical insulation material that can withstand the effects of radiation and 1,000°F without losing its properties.

Called Supramica, the material consists of pulverized synthetic mica bonded with high-grade electrical glass. Synthetic mica is said to be superior to natural mica in its ability to perform at very high temperatures. Previous formulations of natural mica and glass were unable to maintain their mechanical properties at temperatures above 700°F.

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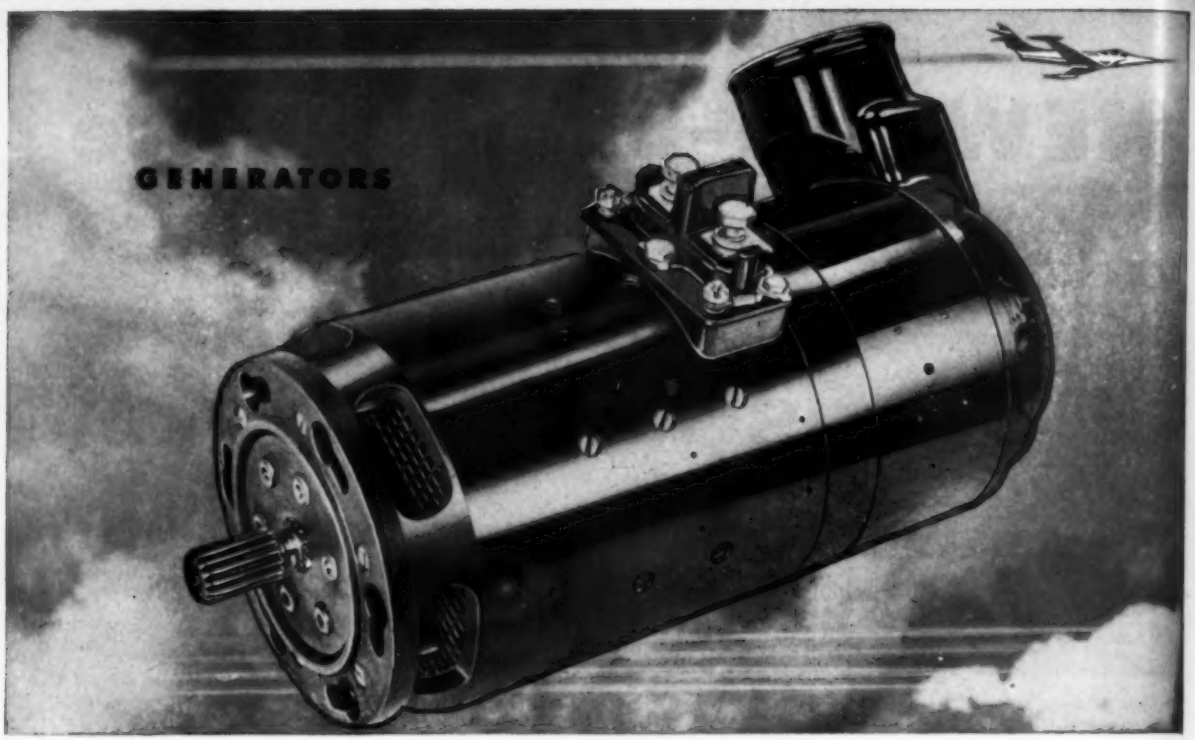

J&H D-C SYSTEMS—THE CHOICE

. . . tailored for ultra-high altitude, ultra-high-speed service

New model Jack & Heintz d-c generators and control panels, capable of satisfying the most severe operational demands, are scheduled for use on two of the latest models of military aircraft . . . complete d-c systems or individual components can be custom built by Jack & Heintz to meet your specific requirements.

GENERATORS . . . The Jack & Heintz line of d-c generators now includes a series of high-performance machines featuring continuous rated load at 8000 rpm. One model has proved performance at 70,000 feet. The generators in this new series which conform to MIL-G-6162 have an unusually efficient *straight-through* air path design for maximum cooling . . . high-temperature insulating materials . . . adjustable blast caps . . . and many other provisions that assure superior service.

CONTROL PANELS . . . Thirty-volt d-c generators with capacities as high as 500 amperes can be controlled and protected by J&H control panels operating with associated equipment. The panels meet all applicable military specifications or can be tailored to special requirements.

Built for long trouble-free service, these lightweight control panels feature simplified installation . . . tray or direct mounted.

J&H panels may include any or all of the following functions (which can be supplied as individual components, if desired): remote or manual trip-free resetting, voltage regulator, differential voltage and reverse-current relay, over-voltage relay, ground-fault relay, field relay, tickler resistor, field relay reset, field relay interlock, blocking rectifier, reverse-current coil and voltmeter test jacks.

JACK & HEINTZ *Rotomotive*

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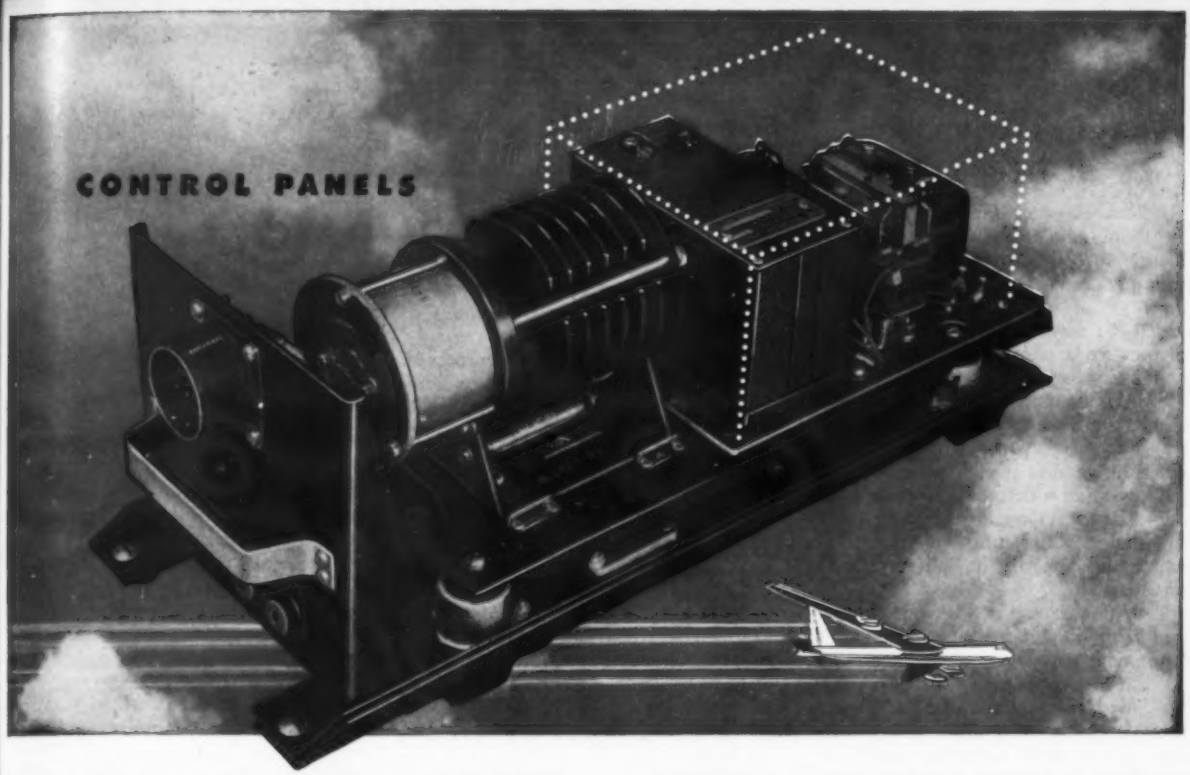

FOR ADVANCED JET AIRCRAFT

Subordinate, but important, components of J&H systems include:

FAULT-SENSING TRANSFORMERS AND SHUNTS

The lightweight J&H current transformers provide simple, trouble-free, generator and feeder fault protection with these major advantages:

1. No steady state power losses.
2. No voltage drops in the feeder cables.
3. No breaks in the feeder cables for coupling.
4. Resistance of cables between sensing elements not critical.

J&H electric shunts provide both metering and feeder fault-sensing voltages for generator control systems. Engineered for maximum performance, minimum space and weight, they can withstand 200% overload for a full minute without damage. All electrical contact surfaces are silver plated; resistance is constant within 2% of rated value in any still air ambient from −55° to +95°C.

COMPLETE FACILITIES

J&H has complete facilities for design, development and testing of your special aircraft accessories or systems . . . production for limited or full-scale runs. We invite your inquiry. Write Jack & Heintz, Inc., 17633 Broadway, Cleveland 1, Ohio. Export Dept: 13 E. 40th St., New York 16, N. Y.

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There's a promising future for electrical and mechanical engineers at Jack & Heintz. Engineering and research laboratories located in suburban Cleveland close to good residential areas. Many benefits include: insurance, hospitalization, medical care and liberal vacation policy. Write Manager of Technical and Professional Placement, today, for illustrated, descriptive booklet.

Military specification numbers as used herein are for purposes of product identification only and do not necessarily imply specification conformity.

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AIRCRAFT EQUIPMENT

Maintenance Bulletin Board

Transcopy Saves Shop Time At Douglas Plant

New photocopying equipment built by Remington Rand, Div. of Sperry Rand Corp. is streamlining paperwork handling at Douglas El Segundo Division.

R-R's new Transcopy Duplex, used to produce a photographic duplicate of manufacturing outlines, now does a job in about four minutes that formerly took 14 minutes to hand type.

Time is particularly important when an outline is split to move some parts with an order, and retain or divert the balance. Douglas employs eight Remington Rand units at key stations where the majority of split orders are initiated.

With as many as 90,000 outlines active in the Douglas plant daily, the new equipment gets wide usage. In the first 45 days of operation, the Transcopy was used to duplicate about 500 split manufacturing orders, and to reproduce 300 miscellaneous documents each day.

Big advantage cited for the equipment, over and above speed, is that of accuracy. The old method of typing duplicate copies of outlines was exposed to typing errors due to peculiar airframe terminology, abbreviations and coding that are difficult to interpret and transcribe accurately without long and constant association.

By way of contrast, Transcopy is 100% accurate and can be operated by personnel with but a few minutes of instruction.

As an added feature, reproduced copies can be used to duplicate additional copies if needed. It is also possible to write on reproduced outlines with any normal medium.

Tire Machine Speeds Braniff Maintenance

A new tire breakdown machine, designed by Braniff Airways shop foreman Marshall Cornwall and built from spare parts at a cost of only $100, is paying big dividends.

It not only takes all the hard work out of the tire dismantling operation, but now breaks down 10 tires in the time formerly required for one.

Before its adoption, Braniff mechanics had to lift a 285-pound aircraft tire and wheel four times during disassembly. Considerable effort was required to break the seal between the tire and rim caused by exposure to heat and pressure while in aircraft service.

Braniff's tire breakdown machine.

With the new machine, the mechanic now simply rolls the wheel and tire into position in the fixture and hydraulic powered tire irons do the rest. Once the seal is broken, it's an easy task to remove bolts from the wheel and slide the tire free.

CAA Asks New Engine Maintenance Methods

Washington CAA officials have urged all U. S. air carriers to adopt new aircraft engine maintenance techniques to preclude cylinder failures resulting from loose or broken hold-down studs.

In recent telegraphic instructions to all regions, CAA pointed to findings of a current air carrier accident investigation in which failure of a cylinder barrel followed earlier operation with a loose hold-down stud.

Accident referred to by CAA is understood to be that of an American Airlines' Convair 240 near Ft. Leonard Wood, Mo. on August 4. Unofficial findings in the AA incident indicate that a cylinder barrel failed resulting in loss of the cylinder. The engine part that failed penetrated the Convair cowling and allowed an engine fire to progress to wing structure, eventually leading to a wing failure during an emergency landing.

New methods recommended by CAA's power plant engineering branch limit operation of cylinders once loose or broken studs are detected. In any instance where two studs or capscrews are found loose or broken, and adjacent studs are torqued to at least minimum torque value, CAA says the cylinder should be removed, inspected for flange warpage and Magnafluxed for cracks. Return to service should then depend on findings.

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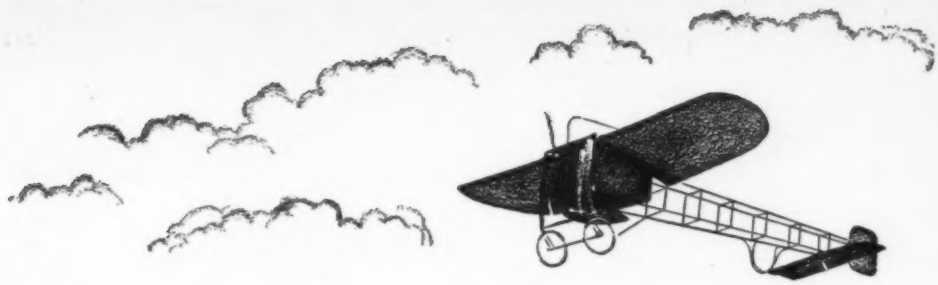

You CAN Afford Travel Safety

Aunt Mehitabel's ideas about "flying machines" are as outmoded as her hats

Modern personal and executive airplanes have a safety record that is superior to that of motor cars *by a ratio of about five to one.*

No one who has experienced the pleasure of flying straight to his destination in a BEECHCRAFT at a speed of from 180 to 215 miles per hour will be content to fight traffic at 40 or 50 miles per hour on the ground, around devious routes.

The cost of a Bonanza is greater than a top-grade car, but it delivers more miles per gallon, and owners often depreciate it over 500,000 miles of use. If usage is reasonably high, the cost per mile is very little more than that of a fine motor car.

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People

MANUFACTURING

Edward R. Toporeck appointed director, field test and instrument staff. **Allen F. Donovan** made director, aeromechanics and propulsion staff, and **Dr. Edward B. Doll,** director, project control staff, Guided Missile Research Division, The Ramo-Wooldridge Corp.

Allen B. Smith appointed chief engineer, aviation department, Socony Mobil Oil Co.

W. I. Maclean named Washington representative of Lucas-Rotax Ltd.

BROWN

TAIT

David H. Brown made asst. gen. mgr. and **Donald W. Tait,** supervisor of advertising and public relations, Pacific Division, Bendix Aviation Corp.

Anthony J. Ming joined the Trade Ayer Co. as vice president.

Herman Plone appointed chief engineer of Aircraft Standards, Inc.

Fritz A. Gross made mgr. of Raytheon Mfg. Co's equipment engineering division.

Herbert Schwartz elected president and sales mgr. of Technion Design & Mfg. Co., Inc.

Lund Aviation, Inc., announced appointments of **Richard C. Csaplar** as secretary and treasurer, **J. Derek Ahlers** as aircraft sales mgr. and **G. A. Scolletta** as mgr. of parts and engine sales.

I. P. Grunwald appointed controller of Lockheed Aircraft Corp.

Paul M. Prophett succeeds E. D. (Sam) Shannon as chief of engineering flight test at Convair's San Diego division; Shannon moves up to a staff capacity.

H. J. Buttner appointed mgr. of engineering for Le Roi Div. of Westinghouse Air Brake Co.

Harry Stolar named asst. gen. mgr. of Marshall-Eclipse div., Bendix Aviation Corp.

AIRLINE

William J. Mitchell appointed vp-traffic and sales for Bonanza Air Lines.

T. E. "Tom" Dawson made superintendent of stewardess service, United Air Lines.

Frank Lynott named vp of freight operations and **John Higgins** advanced to vp of sales, The Flying Tiger Line.

British Overseas Airways Corp. announced a series of personnel changes: **H. O. Houchen** becomes deputy operations director; **J. R. Stainton** succeeds Houchen as gen. mgr., stations and traffic; **Gilbert Lee** made gen. sales mgr.

Nikolaus Serkes named reservations superintendent of Airwork Atlantic Ltd.

Edward F. Norman named vp-operations of United States Overseas Airlines.

Julio San Gabriel made U. S. sales mgr. for Iberia (Air Lines of Spain).

HONORED

Don R. Berlin, president and chairman of the board of Piasecki Helicopter Corp., received honorary insignia of American Volunteer Group at reunion banquet of 14th Air Force Assn., as a memento of his work in designing the Curtiss-Wright P-40 pursuit plane.

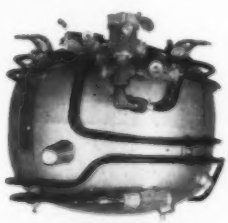
Arthur C. Storz, Omaha business and civic leader, was presented the President's Trophy and named the AFA's "Man of the Year" at the Airpower Banquet of the national convention.

Lt. Gen. Bryant L. Boatner (USAF) received the Distinguished Service Medal for outstanding accomplishments as Deputy Chief of Staff, Materiel.

AMONG LEADING PERSONALITIES at Air Force Association convention in San Francisco last month were, left to right, Edward H. Waller, Deputy Assistant Secretary of the Air Force; Joseph W. Crosby, president of the Thiokol Chemical Corp. and Gill Robb Wilson, newly elected president of the AFA. Meeting took place at Thiokol's party honoring outstanding Air Force recruiters.

ARO *Vision-eering Leads*
IN OXYGEN EQUIPMENT

20 LITER CONVERTER



5 LITER CONVERTER

ARO Liquid Oxygen Converters save space and weight . . .

make one tank of liquid do the job of many tanks of gaseous oxygen! This important forward step in oxygen supply is another ARO *first!*

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how do you measure yourself?

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Opportunity is a nebulous term, spelled out below is the McDonnell definition of this word:

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McDonnell's salary structure is comparable to the best in the industry.

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Our *3* engineering divisions—Airplane, Helicopter and Missile are now at work on *12* different development contracts. This multiple project operation allows us greater flexibility in assigning and re-assigning our engineers.

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McDonnell engineers are reviewed every three months by their supervisors and raises and promotions are granted on a strict merit basis with demonstrated ability the primary consideration.

SELF IMPROVEMENT

In addition to a complete in-plant training program, McDonnell engineers are encouraged to attend one of our two local universities for advanced engineering training.

STABILITY

At McDonnell we have never had an engineering layoff in the company's sixteen year history. Our engineering staff has grown steadily, even during the so-called "lean years" of defense work—1945-50.

MR. ENGINEER

If you agree with this definition of *opportunity* and would like more information about our company and our community, complete the blank below and mail to:

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• **August C. Esenwein,** Convair vice president and mgr. of Fort Worth plant.

• **W. P. Ethridge, American Airlines.** foreman-maintenance, Amon Carter Field, Fort Worth.

• **M. T. Rosenbaum,** American Airlines. Mgr. aircraft service, Tulsa.

• **J. P. Bondurant,** American Airlines. Gen. foreman-aircraft maintenance, Los Angeles.

• **J. T. Miller,** American Airlines, Inspector-maintenance, Chicago.

• **M. K. Davis, Jr.,** American Airlines. Mgr. of operations, Albany, N. Y.

• **Clarence Opsahl,** Northwest Orient Airlines. Captain, Seattle.

• **R. H. Peterson,** Northwest Orient Airlines. Mechanical foreman, St. Paul.

• **Joe Ohrbeck,** Northwest Orient Airlines. Captain, Seattle.

• **Torfin Hillis,** Northwest Orient Airlines. Captain, Seattle.

• **Ronald E. Stelzig,** Northwest Orient Airlines. Superintendent flight dispatch and performance engineering, St. Paul.

• **Russell J. McNown,** Northwest Orient Airlines. Captain, Seattle.

• **Frank J. Toll,** Northwest Orient Airlines. Master mechanic, St. Paul.

• **Walter R. Bullock,** Northwest Orient Airlines. Captain, Tokyo.

• **Emil C. Heideck, Jr.,** Northwest Orient Airlines. Asst. superintendent of component overhaul, St. Paul.

• **John Rosbach,** Northwest Orient Airlines. Mechanical foreman, St. Paul.

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• **Richard Hutton,** Grumman Aircraft Engineering Corp. Chief engineer, Bethpage, N. Y.

West Coast Talk . . . By Fred S. Hunter

- **Things were different back in 1933.**
- **How low-ceiling landings were made.**

NEXT TIME you drop into Burck Smith's office at American Airlines in Los Angeles have him show you his 1933 airline map. *Fortune* magazine printed it originally and, in an effort to be helpful to any readers who might have contemplated risking a trip, had the artist letter-in some editorial comment on the various points around the country. Here are a few choice samples:

Hunter

Atlanta—EAT passengers eat a good southern meal for 75¢ at the Candler (Coca Cola) field restaurant.

Charleston, S. C.—Here may be transatlantic airway terminal. First stop out, Bermuda.

Cheyenne, Wyo.—Thin air (alt. 6,000 ft.) makes landings fast here.

Kansas City—Here Mary Pickford telephoned her N. Y. astrologer, found the stars unfavorable, discontinued her transcontinental trip.

Los Angeles—TWA flies fastest coast-to-coast passenger schedule, 24¾ hours eastbound, 28¾ hours westbound.

Newark—World's busiest airport, 99,600 passengers in 1932.

Reno—Between Rockies and the coast is bumpiest air ride. Advice: eat sparingly, avoid fatty foods.

• •

If you have ever wondered how low-ceiling landings were accomplished in the days before radar and ILS, here's the answer from the scrapbook of Seely V. Hall, assistant vice-president-facilities, United Air Lines. As UAL's station manager at San Diego in 1932, Seely issued the following down-through procedures to pilots:

"When the ground man picks up an approaching ship, the pilot will be asked to 'blimp' his motor for identification. United Air Lines will be one blimp, American Airways two blimps, and Western Air Express, three blimps. When it has been established that yours is the motor we are hearing, you will be advised your approximate position and direction from the field, and we will continue to advise you until you arrive over the field, and you inform us that you are ready to come down through.

"If, in our opinion, you are in position to come down through, we will give you an O.K. Jazz your motor at frequent intervals as you come down, and we will advise your approximate position. When your plane is sighted underneath, we will tell you where you are, and give surface wind and any unusual field obstructions. You should advise us as soon as you see the ground."

• •

Allison is working for a still lower ground idle speed for the 501 engine for the Lockheed Electra to promote a little peace and quiet around gate positions and taxiing. It is now 10,000 rpm compared to 13,820 rpm for the other speeds (takeoff and cruise.) Propellers operating at high speed near zero thrust create a most astonishing amount of noise.

Allison didn't have to worry about this with the military T56s which power the Air Force's C-130s, but civilian ear-drums are somewhat more sensitive.

Lockheed has had good experience with one test airplane, a Navy R7V-2. This has even more powerful engines, P&W T34s. But P&W developed a set of controls to permit ground idle to be reduced from 76% to 56%.

Lockheed finds this plane, taxiing around Lockheed Air Terminal, has a noise level about the same as Super Connies equipped with Turbo Compounds. It is inoffensive.

• •

A higher zero fuel weight is the secret to the higher payload of Lockheed's Model 1049H cargo aircraft. It's 108,000 pounds as compared to 103,500 pounds for its passenger counterpart, the Model 1049G Super Connie.

• •

TODAY'S PERFORMANCE
TOMORROW'S PROMISE

For nearly a generation such great fighter planes as REPUBLIC's Thunderbolt and Thunderjet have written their own imperishable records of combat superiority. Today . . . two rugged, powerful members of this warrior clan, the F-84F Thunderstreak and the RF-84F Thunderflash, are on active service adding to the versatility of our U. S. Air Force. ➤ These swept-wing newcomers emphasize the sleek silhouette which has long been the pride mark of Thundercraft. ➤ The potential of the F-103 and F-105 stresses that never in a long, proud history have the touch of engineering genius and production experience been so skillfully combined. ➤ On drawing boards and in the experimental stage are other almost unbelievable new concepts of advance in aeronautical sciences. Whatever military missions tomorrow's Air Force fighter units are called upon to perform . . . you may depend upon Thundercraft to be in the van.

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Designers and Builders of the Incomparable **THUNDER-CRAFT**

By Anthony Vandyk

Aer Lingus believes that its seasonal problem is greater than that of any other international airline. The seasonal character of the Irish airline's traffic makes it necessary for the company to maintain an organization and a fleet of aircraft nearly twice as large as would be necessary to carry the same volume of traffic if the business were spread fairly evenly throughout the year.

While Aer Lingus must be prepared to carry up to 17,000 passengers a week in order to meet the summer peak demand, the volume of traffic carried during the five winter months from November to March averages less than 3,500 passengers a week; in fact, during a substantial part of the winter the loads average only 2,500 passengers a week, or less. In other words, during the winter 80% of the company's peak capacity is unused.

• **The extreme fluctuations** in traffic present Aer Lingus with a special problem which shows itself in (1) a heavy concentration of traffic in the summer months, together with (2) marked fluctuations between midweek and weekend loads, and (3) a strong reluctance on the part of passengers to travel early in the morning and late at night unless some special reduced fare is offered.

The second of these problems has been dealt with over the last six years by lower midweek fares which encourage travel on days during the busy summer months, when the company seeks to spread the demand for seats over all of its scheduled flights. The alternative would be to disappoint would-be passengers at peak weekends while operating with relatively light loads on other days of the week.

• **Aer Lingus also endeavors,** with considerable success, to overcome passengers' reluctance to fly outside conventional hours by offering reduced fares for early morning and late evening flights.

Aer Lingus officials say, however, that there is no obvious solution to the difficulties occasioned by the summer peak. They note, realistically, that experience, both their own and others', has shown that while off-season fares during the winter may create some new traffic, they rarely succeed in diverting passengers from summer to winter. As an illustration of the effects of a combination of the weekend and summer peaks on the pattern of passenger traffic, Aer Lingus on July 31, 1954, carried 3,423 passengers, while on February 7, 1954, only 228 passengers flew on all services!

Canadian Airlines Exchange Routes

In a series of partly inter-related events north and south of the border, Canadian airlines have exchanged routes while a Mexican carrier has bought Constellation equipment to start service to Canada. Canadian Pacific Airlines will take over the Trans-Canada Air Lines route from Toronto to Mexico City and, in return, will turn over to TCA its services between Montreal, Quebec City, Saguenay and Seven Islands, and between Montreal, Val d'Or, Rouyn-Noranda and Toronto. Moreover, CPA's present operation from Quebec City to Baie Comeau and Forestville will be taken over by Quebecair which flies extensively in that area.

CPA already flies from Vancouver to Mexico City and on to Lima, using DC-6Bs. Use of this equipment will enable the Toronto-Mexico City service to be flown non-stop (the TCA operation, with North Stars, makes an intermediate non-traffic landing at Tampa).

The additional service from Toronto, permitting one-carrier service to the West Coast of South America, is expected to strengthen materially CPA's entire southern route structure. Moreover, as CPA's present services in Eastern Canada are remote from the company's main overhaul and maintenance base in Vancouver termination of these operations will obviate a considerable amount of ferry flying between the eastern terminal points and the Vancouver headquarters.

• **For TCA** the exchange of routes means that the airline gains its first entry to the province of Quebec east of Montreal and is permitted to put Quebec's capital city on its transcontinental route for the first time.

As a result of the route exchange it seems likely that CPA will not be disposed to contest Guest Aerovias Mexico's request for a monopoly on the Mexico City-Windsor, Ontario, run (Windsor is just across the border from Detroit and serves a rich U. S. travel market). Seemingly confident that it will be permitted to serve the Canadian city, Guest has bought two L-749A Constellations from Qantas Empire Airways. The new equipment will partially supplant DC-4s on the Mexico-Miami and Mexico-Panama City routes, it has been indicated.

Transport Briefs

East Germany's Lufthansa is headed by **Arthur Pieck**, son of the president of the Soviet-occupied state; operations will be started within a few weeks . . . **Trans-Canada Air Lines** will use 50-seat two-abreast accommodations in its North Stars when it introduces tourist-class service on its routes to Florida, Bermuda and the Caribbean on November 1 . . . **Aryana Airlines** is the name of a new airline established in **Afghanistan** (P. O. Box 76, Kabul) . . . **KLM Royal Dutch Airlines** will get its first two L-1049G Super Constellations in January and two more in February.

SPAIN'S first jet aircraft, the Hispano Aviacion HA-200 R-1 Saeta, made its first flight August 16. Powerplants are two Turbomeca Marbore jets of 880 lbs. thrust each.

power in four packages
One big advantage of the Napier Eland propeller-turbine is easy maintenance. Eland power comes in four packages — (1) the reduction gear assembly, (2) the compressor assembly, (3) the main support plate and combustion chamber assembly and (4) the turbine unit. Interchangeability of these major components is catered for, thereby ensuring simple and cheap maintenance.
more facts about the Eland
* High aerodynamic efficiency — 3,000 e.h.p. in a maximum diameter of 36 inches.
* Low specific weight — 0.52 lbs./e.h.p.
* Low specific fuel consumption — 0.450 lbs./e.h.p./hr. at 36,000 ft. 400 knots cruising: 0.505 lbs./e.h.p./hr. at 20,000 ft. 350 knots cruising.
* Ease of control — single lever control with manual over-ride, guards against engine overspeeding and overfuelling.
* Automatic temperature compensation.
* At the first attempt the Eland has recently passed a 150 hour type test rehearsal at the full 3,000 e.h.p. rating.

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Circle No. 31 on Reader Service Card.

Ambrose Aviation to Lease C-125s For Heavy Duty Cargo Operations

THREE-ENGINE WORKHORSE built by Northrop is going back to the fields. Ambrose Aviation has acquired 18 of the 23 built and will lease them to companies requiring a rugged aircraft. The C-125 trimotors were recently sold as surplus by the Air Materiel Command. Disposition of the other five: one bought by Planet Airways; two donated to schools; two disassembled.

Eighteen Northrop C-125 three-engine cargo transports are being made available for lease by Frank Ambrose Aviation Company of Miami. The planes were purchased as surplus from the Air Materiel Command recently. Lease price has been set at $2,500 per month plus a "small hourly engine overhaul reserve rate."

Northrop built 23 of the aircraft with the first production model making its first flight in the summer of 1949. The 20-ton plane was designed for heavy-duty Arctic rescue work and is particularly adapted to rough terrain with short take-off and landing characteristics.

Frank Ambrose, president of the Miami company, feels that the planes can best be used in industrial applications, involving *uranium prospecting* where high-powered heavy detecting devices must be carried to uncharted areas; *oil prospecting* in wild territory where ground crews and equipment must be parachuted in; *cargo operation* in hauling large volume of newspapers, livestock, trucks, into areas without airports; *pipeline and power line inspection*. He also envisions many other uses by lumber and paper mills, mining industry, etc.

The company is planning a modification that would make one or more of the aircraft a combination cargo/passenger plane by installing Payloader folding seats. Another plan calls for installing Wright R-1820-76 engines (rated at 1425 hp) in one of the planes instead of the 1200 hp R-1820-99 to increase designed gross weight to 45,000 pounds, and by eliminating some military equipment and modifications, it is expected the empty weight can be reduced from the present 26,290 lbs. to 24,500 lbs. allowing the useful load of 20,500 lbs.

Main characteristic of this "workhorse" is its ability to land with 400 feet ground roll and takeoff in 800 feet with no wind. It has a maximum range of 2,000 miles; maximum cruise at 5,200 feet of 201 mph and cruise at 70% power with a 36,000 lbs. gross weight of 169 mph. Stalling speed is 69 mph with full flaps. Maximum ceiling is 15,200 feet; service ceiling, 6,250 feet with two engines.

CAA airworthiness certification tests were 75% completed when Ambrose acquired the aircraft. He said his company might go ahead and complete the tests.

Safety Award Winner Chosen by NBAA

Selection of the recipient of the first Women's Aeronautical Association of Kansas award for contributing the most to the advancement of business flying safety during 1954 was made by the National Business Aircraft Association awards jury in Washington last month. Announcement of the person chosen will be made during the NBAA annual meeting in Detroit October 5-7, when a specially-designed trophy will be presented.

Members of the award jury are: Walter C. Pague, NBAA, Chairman; Mrs. Adella Allen, WAAK; Joseph T. Geuting, Jr., director of the Aircraft Industries Association's Military Aircraft Council; Jerome F. Lederer, managing director, Flight Safety Foundation; Charles S. Logsdon, executive secretary, National Aeronautics Association; Mrs. Frances Nolde, director of general aviation division of the Defense Air Transportation Administration; Col. A. B. McMullen, National Association of State Aviation Officials; and Mrs. Nancy Moore of the "99s," national women's aeronautical organization.

TYPE CERTIFICATE for the four-place Mooney Mark 20 is presented to Hal F. Rachal, Mooney president and board chairman (right) by Calvin L. Johnston, CAA regional chief of engineering (left) while designer Al Mooney looks on. First production aircraft was to be completed this month. Single-engine lightplane features retractable tricycle landing gear and a laminar flow wing. It is powered by the Lycoming 150 hp engine, cruising at 165 mph with a 1,000 mile range.

New Vought "Crusader"...

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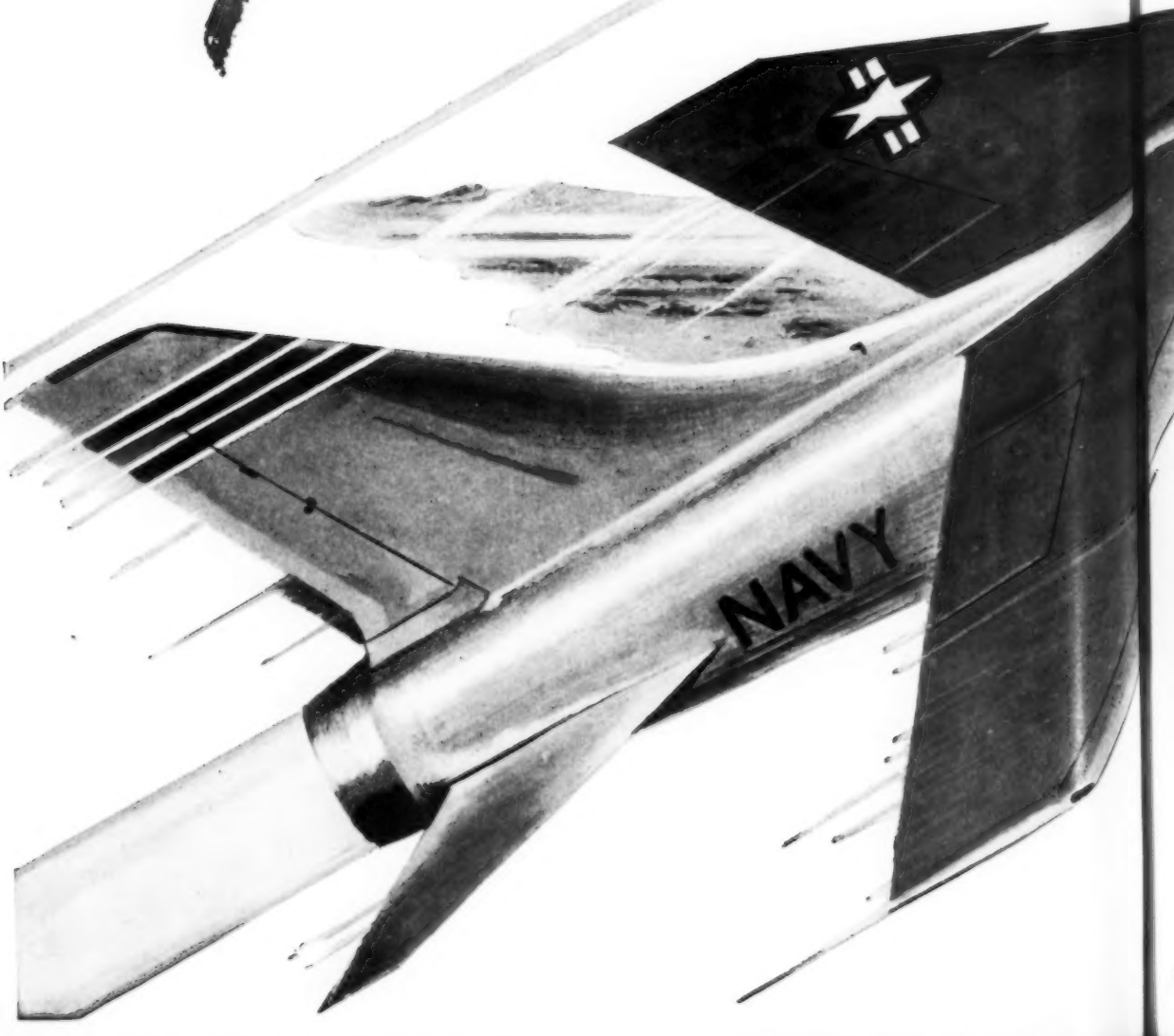

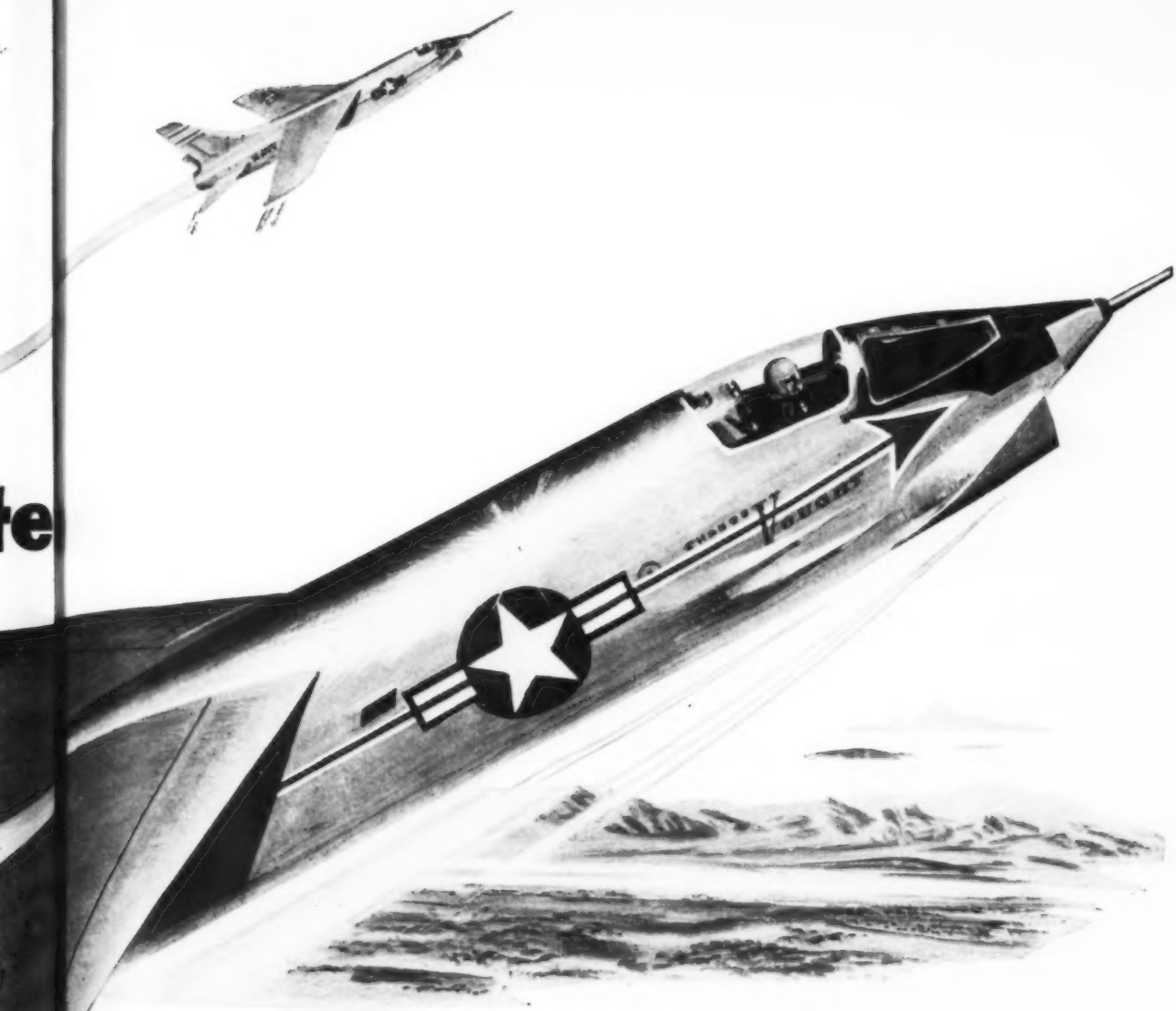

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AVRO AIRCRAFT LIMITED
MALTON, CANADA
A. V. ROE CANADA LTD.—MEMBER, HAWKER SIDDELEY GROUP.

In RCAF operational multi-squadron service in Canada, squadrons of CF-100s will begin duty with NATO forces in Europe by 1956.

TRANSPORT TRENDS Washington, D. C., Sept. 12, 1955

CAB ROUTE AWARDS IN THE NEW YORK-CHICAGO CASE, decided early this month, indicate that regional carriers will be strengthened, coach progress in some cases will be rewarded, and antiquated route restrictions will be lifted where practicable.

Capital Airlines was major recipient with new unrestricted rights between New York and Chicago, Detroit, Toledo and Pittsburgh; a new segment between Detroit and New York via Buffalo and Rochester, and addition of Philadelphia to present routes.

Northwest Airlines also was "strengthened" by grant of direct Chicago-New York rights; also, restrictions were lifted on New York-Detroit service.

Trans World Airlines was authorized to serve Detroit and Cleveland on east-west transcontinental route; United was granted non-stop rights between Seattle/Portland and Chicago; and Eastern's "closed door" restriction on service between Pittsburgh and Akron, Cleveland and Detroit was lifted.

In the New York-Louisville market American, Eastern and TWA—formerly required to make one intermediate stop—were granted new non-stop rights.

ANNOUNCEMENT THAT PETER G. MASEFIELD will resign from British European Airways on October 31 to become an aircraft manufacturing executive is being viewed as one of the most significant developments in British aviation in recent years. Masefield, an avid turboprop enthusiast, will become managing director of Bristol Aircraft Ltd., a subsidiary to be formed under Bristol Aeroplane Co., Ltd., from which post he presumably will direct future development and sales of the Bristol Britannia turboprop transport.

In a joint announcement by BEA and Bristol, it is emphasized that Masefield is not leaving the nationalized airline due to any disagreement, but because he desires to contribute to the development of the British aircraft industry.

AFTER A DECIDED LULL, obviously influenced by American Airlines' competition for a short range turboprop transport, sales of Convair Model 440 twin engine transports are on the rise. Most recent order, that of Sabena for 12 440s, brings the total to 38. Other carriers buying the Convair are Scandinavian Airlines System—11 (See story, p. 86); Real S/A Transportes Aereos—4; Aero O/Y (Finnair)—1; and, Continental Air Lines—3. In addition, an executive 440 will go to Cities Service Oil Co. and the U.S. Air Force will receive six military versions called C-131Ds.

DEMANDS OF BUSINESS AIRCRAFT USERS for higher speed aircraft are spurring development of "supercharged" versions of several executive aircraft types. Aero Design & Engineering Co. has already announced its Super Aero Commander, the Model 680, having a top speed of 260 mph and a cruise of 230 mph at 10,000 feet. Priced at about $84,500, the Model 680 will be produced alongside the 560A Aero Commander and will enter production in January 1956.

Announcement of the Super Aero Commander was followed immediately by reports that Beech Aircraft Corp. is working on a supercharged version of its Twin Bonanza.

NEW EMPHASIS ON GOVERNMENT PARTICIPATION in safety matters has been recommended by a CAA Safety Committee studying industry responsibilities. Prime CAA responsibility, the group found, should be in development of standards, rules and regulations—with the responsibility for compliance shifted to industry and only monitored by CAA. Enforcement action on violations, it felt, should be a joint government-industry activity.

One important recommendation proposes that CAA's present role in certification of new aircraft be delegated to industry. Group's findings are being circulated to industry for review as a basis for a planned series of discussions between CAA and industry representatives.

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Circle No. 33 on Reader Service Card.

Coach Volume Zooms to $250 Million a Year

- **Low-fare service now produces 34.3% of domestic trunklines' passenger traffic.**
- **CAB, once cautious about low-fare operations, encourages extension.**

By WILLIAM V. HENZEY

FROM A TOKEN EXPERIMENTAL OPERATION conducted under tight Civil Aeronautics Board reins only five years ago, coach service of the domestic trunk airlines this year will blossom out into a quarter-billion dollar business under the most conservative estimates.

Twelve of the 13 certificated trunks now provide coach service (at fares ranging from 3.2¢ to 4.5¢ per mile) and, according to first-half traffic records this year, nine of those 12 are registering spectacular rises in coach traffic.

The low-fare service, which at one time was limited by a cautious CAB to off-hour flights and designated high-density segments (to prevent diversion from 6¢ first-class service), now produces 34.30% of total passenger traffic of the trunk industry. That is a gain from 31.76% for the first six months of 1954.

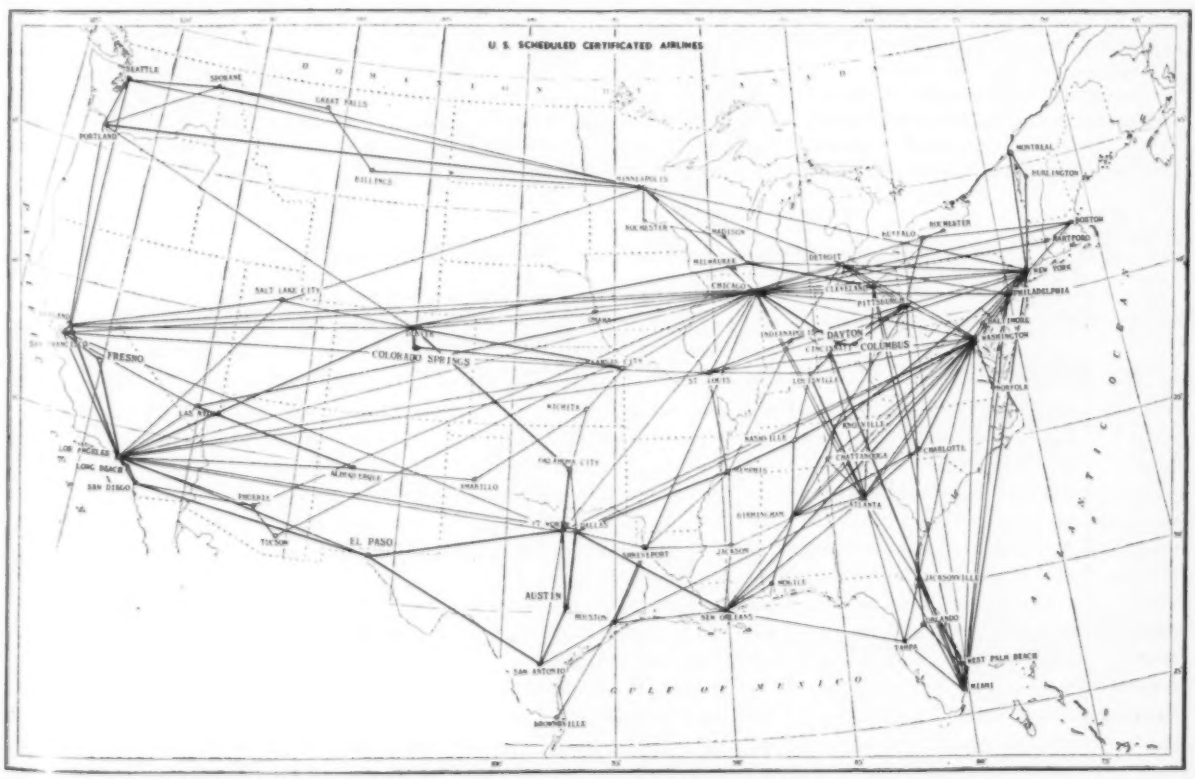
• **For two lines**—National and TWA—coach amounts to 55.12% and 51.66% respectively, of total passenger traffic. Eastern, which edged past TWA for leadership in coach traffic this year on a 36% gain, is fast approaching the point where coach will overtake other traffic. For the first half of 1955, EAL's ratio of coach to total was 44.12%, compared with 38.89% a year ago.

American, which hung around 20% last year, increased its ratio to 25.39% this year, with a 46% gain in coach passenger-miles. United's ratio was up from 27% to 28.63% on a 38% coach traffic gain.

For the industry as a whole, coach traffic was up 29% for the January-through-June period as against a 19.6% gain in all types of passenger traffic.

• **A continued upswing** in low-fare traffic by National, Delta-C&S and Western, plus new emphasis on that type service by Braniff and Continental, makes it difficult to prove that the Big Four have been chiefly responsible for the spectacular coach rise.

Yet, a continuation of past leadership by Eastern and TWA, plus the surges this year by American and United, results in a Big Four total of



AIRCOACH SERVICE is now available over routes of 12 of the 13 certificated trunklines, virtually blanketing the country.

Domestic Trunklines Coach Record (Passenger-Miles)

Carrier	First Six Months, 1955 Total (000s)	Coach (000s)	Percent	First Six Months, 1954 Total (000s)	Coach (000s)	Percent
Eastern	1,757,620	775,478	44.12	1,466,990	570,463	38.89
TWA	1,290,901	666,829	51.66	1,183,610	605,438	51.15
American	2,018,835	512,546	25.39	1,746,060	350,169	20.05
United	1,772,163	507,406	28.63	1,347,426	366,262	27.18
National	485,604	267,663	55.12	375,442	203,659	54.25
Delta-C & S	500,882	148,179	29.58	387,448	78,662	20.30
Northwest	368,189	130,180	35.36	337,220	133,103	39.47
Western	238,218	79,673	33.45	178,791	67,061	37.50
Capital	372,903	55,558	14.90	343,144	71,355	20.79
Braniff	295,710	14,606	4.94	244,325	5,115	2.09
Continental	101,584	11,926	11.74	76,272		
Colonial	49,953	3,801	7.61	45,023	4,218	9.36
Totals	9,252,562	3,173,845	34.30	7,731,751	2,455,505	31.76

coach passenger-miles (2,462,259,000) in excess of the total passenger-miles (first-class, coach and family plan) of the other nine trunklines (2,459,639,000).

Also, coach traffic alone of any one of the Big Four exceeds the total passenger traffic of any one of the other nine carriers.

• **With three of the Big Four** (TWA, United and American) effecting sharp cuts in transcontinental coach fares this month, it is safe to say that coach is entering a new era of stepped-up activity which promises even more emphatic gains for the future.

In line with their relative position in the industry, however, some of the so-called "regional" trunks registered significant gains. National, perennial runner-up to the Big Four in coach traffic, held its position with a 31% gain in the first half this year.

Delta-C&S, with an 88% gain in coach passenger-miles, replaced Northwest as the sixth largest coach operator. Western's coach traffic was up 19% and Braniff and Continental moved up.

• **Only three lines** carried less low-fare traffic this year than last: Capital, Colonial and Northwest. Northeast Airlines is the lone trunk carrier not in the coach business.

Meanwhile, the CAB, after being extremely cautious at first, is obviously now enthusiastic over any expansion in low-fare operations the industry can make.

Since such expansion, as it cuts into total traffic of the industry, amounts to a general though gradual reduction in fare yields, there is a question as to where the Board might feel a happy medium has been reached.

• **On this point,** CAB Vice Chairman Joseph P. Adams may have given the answer two years ago. At that time, the ratio of coach-to-total traffic was 20%. Adams, who was not one of the cautious Members years ago when the strings were held tight on coach expansion, said he would not be happy until the ratio was reversed and coach produced 80% of total passenger traffic.

Despite the lower fares of the three transcontinental lines, however, there are no indications that the industry is ready to approach the 80% figure within the next few years.

One reason is equipment, or lack of it. While coach is growing by leaps and bounds, over-all passenger traffic is at an all-time high taxing all present equipment. Industry traffic officials frankly admit that it would be tantamount to economic suicide to convert 6¢ per-mile passengers into 3¢ and 4¢ passengers without provision for the necessary off-setting additional traffic.

Thus, they indicate, Adams' prediction will more likely come true as the transition to jet transport aircraft becomes more of a reality, freeing existing first-class equipment for coach expansion.

• **In the meantime,** as first-half traffic records and new low-fare tariffs indicate, coach development will be far from stagnant.

The immediate area of expansion, in view of the tight equipment situation, perhaps is best indicated by the new transcontinental tariffs of TWA, United and American. Containing fares 20% under normal coach fares, the tariffs apply to travel on specific days of the week (Monday through Thursday) when space is available on existing coach schedules.

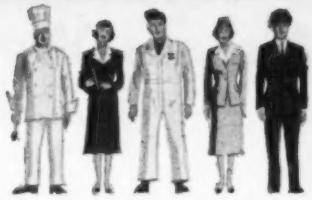
The immediate aim, therefore, is to fill up existing empty seats on normally weak traffic days. This alone is expected to confirm predictions made early this year that coach traffic for 1955 will total 6.5 billion passenger-miles provide over $250,000,000 in revenues and set the stage for the next era of expansion. • • •

U. S. Local Service Airline Traffic For Second Quarters, 1955 and 1954

(Compiled by American Aviation Publications from Official CAB Data)

AIRLINES	REVENUE PASSENGERS (IN THOUSANDS) 1955	1954	% Change	REVENUE PASSENGER MILES (IN MILLIONS) 1955	1954	% Change	AVAILABLE SEAT MILES (IN MILLIONS) 1955	1954	% Change	PASSENGER LOAD FACTOR 1955	1954	FREIGHT TON MILES (IN THOUSANDS) 1955	1954	% Change	TOTAL TON-MILES REV. TRAFFIC (IN 000'S) 1955	1954	% Change	AVAILABLE TON-MILES FLOWN (IN 000's) 1955	1954	% Change	% AVAILABLE TON-MILES USED 1955	1954
Allegheny	94.0	71.8	30.9	15.0	10.8	38.9	30.3	23.3	30.0	49.50	46.35	0	0	0	1,493	1,074	39.0	3,017	2,335	29.2	49.49	46.00
Bonanza	25.9	18.7	38.5	5.6	4.3	30.2	13.0	8.9	46.1	43.08	48.31	15.0	8.9	68.5	568	429	32.4	1,352	1,009	34.0	42.01	42.52
Central	24.9	15.9	56.6	4.0	2.1	90.5	13.9	9.9	40.4	28.78	21.21	14.2	9.7	46.4	410	226	81.4	1,594	1,075	48.3	25.72	21.02
Frontier	44.5	35.0	27.1	11.7	8.8	33.0	25.6	22.3	14.8	45.70	39.46	178.9	118.2	51.4	1,360	1,028	32.7	2,435	2,126	14.5	55.85	48.21
Lake Central	29.2	21.4	36.4	4.4	3.1	41.9	12.1	10.7	13.1	36.36	28.97	0	0	0	434	314	38.2	1,303	1,153	13.0	33.31	27.23
Mohawk	68.8	58.5	17.6	12.3	10.4	18.3	19.9	19.4	2.6	61.81	53.61	20.3	20.3	0	1,223	1,036	18.1	1,995	1,937	3.0	61.30	53.48
N. Central	110.7	71.2	55.5	17.4	11.9	46.2	33.8	26.5	27.5	51.48	44.91	0	0	0	1,773	1,175	50.9	3,859	3,027	27.5	45.94	38.82
Ozark	67.3	40.8	65.0	10.1	6.6	53.0	25.6	18.7	36.9	39.45	35.29	0	0	0	1,002	655	53.0	2,525	1,842	37.1	39.68	35.56
Piedmont	100.3	84.5	18.7	19.2	16.9	13.6	34.9	34.3	1.7	55.01	49.27	37.5	33.5	11.9	1,934	1,707	13.3	3,559	3,491	1.9	54.34	48.90
Southern	45.9	34.0	35.0	7.8	5.7	36.8	17.4	16.5	5.5	44.83	34.55	0	0	0	801	586	36.7	1,887	1,788	5.5	42.45	32.77
Southwest	70.7	52.4	34.9	13.4	9.7	38.1	23.8	17.0	40.0	56.30	57.06	38.6	18.7	106.4	1,349	967	39.5	2,419	1,724	40.3	55.77	56.09
Trans-Texas	40.7	35.1	16.0	9.2	7.6	21.1	23.2	24.2	-4.1	39.66	31.40	41.2	29.6	39.2	972	793	22.6	2,648	2,769	-4.4	36.71	28.64
West Coast	54.0	47.1	14.6	9.1	8.3	9.6	20.2	18.7	8.0	45.05	44.39	22.6	11.1	103.6	863	774	11.5	1,785	1,648	8.3	48.35	46.97
TOTALS	776.9	586.4	32.5	139.2	106.2	31.1	293.7	250.4	17.3	47.40	42.41	368.3	250.0	47.3	14,382	10,761	31.8	30,378	25,924	17.2	46.69	41.51

What airline has an expert in every job?



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A while ago someone asked one of our Mainliner cabin cleaners, "Why are you so particular about getting every speck? Do you think the passengers will notice the difference?"

The cabin cleaner was surprised by the question. "You bet they will," he replied. "My passengers like to have their airplane clean, same as their homes. *They expect it on United Air Lines.*"

The remark illustrated the kind of pride you'd find in every position on United Air Lines. All of the 18,000 United people feel the same way about "Service in the Mainliner Manner."

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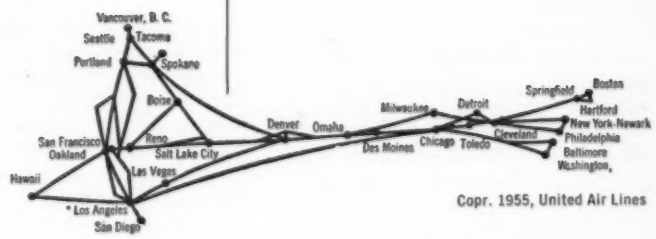
UNITED AIR LINES



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Airlines Weigh Jet Decision: DC-8 or 707?

Design vs. delivery advantages pose competitive problems; Pentagon security policy hurts foreign carriers.

A LARGE-SCALE jet transport buying spree by U.S. and foreign airlines has been temporarily sidetracked by behind-the-scenes jockeying by carriers for best competitive position in the future jet race.

Although firm jet orders from major U.S. airlines are still expected within weeks, and most certainly before the year-end, competitive aspects of the two available aircraft—Boeing's 707 and Douglas' DC-8—have created an unprecedented equipment procurement situation.

Carriers such as American, Pan American, Eastern and United, representing a market for about 100 jets, are weighing answers to the big question: Which aircraft will it be? Forcing the competitive equipment aspects right close to home is a fifth big airline, Trans World Airlines, historically a lone wolf in aircraft buying through its principal stockholder, Howard Hughes.

What the four carriers are now pondering boils down to a choice between the airplane they favor and a delivery schedule that will put them up front in jet operation.

• **If they decide on the DC-8,** fear is that Hughes would immediately step into the picture with a Boeing 707 order for TWA and gain a 1½ to two-year competitive edge in jet introduction in airline service.

• **Should the decision favor the Boeing 707** to erase this threat, apprehension continues to exist as to whether they are getting the best jet buy for commercial airline service. First sign of this uncertainty came to light recently in a statement by United Air Lines' president W. A. Patterson.

Commenting on the relative merits of the two aircraft, Patterson noted that although the Boeing 707 prototype has been flying for a year, it has been built for military order. The DC-8, he said, is still in the design stage and is more flexible for tailoring to airline requirements.

General feeling among airline engineers is that any transport design being built primarily for military use is bound to suffer many hidden penalties in weight and performance when adapting it as a commercial transport vehicle.

A second factor that makes carriers hesitant to go "whole hog" for the 707 is the wealth of transport experience they have amassed in the postwar period with Douglas equipment, as contrasted with only limited experience by a few carriers with Boeing 377 Stratocruisers.

A third big element in the whole competitive scheme is that the high cost of jets makes it most profitable for the big carriers to deal with one manufacturer in order to realize the lowest per-unit costs possible. However, failure of one major airline to go along, as in the case of the Hughes-TWA combine, relegates the matter of pooled orders to an almost insignificant role.

• **As a result,** heads of two major airlines, C. R. Smith of American and Juan Trippe of Pan American, are reportedly in day-to-day discussions attempting to resolve their future course of action in an investment that could make or break their respective companies.

On the foreign airline scene, although it is taken for granted that orders from abroad will closely follow those of U.S. carriers, another obstacle has loomed. Negotiations for jet transports by these airlines, because of military security limitations of the classified Pratt & Whitney J57 engine, do not enjoy the same free exchange of performance data as do those of U.S. airlines.

For example, in dealing with a foreign airline, Boeing is permitted to give overall performance data on the 707 with J57s but cannot give details on engine performance. In theory, however, Boeing today can sell 707s to foreign airlines complete with J57s and the carrier could find out all there is to know about the engine.

By way of contrast, security-cleared U.S. carriers can learn all there is to know about J57 engine performance, a situation which foreign carriers feel represents a decided competitive advantage in negotiations for jet transports.

Attitude among aircraft manufacturers, here, as expressed by one official, is that the disadvantage, if it exists at all, is purely academic. Reason is that even if a foreign carrier were to order a jet today, it couldn't be made available until long after security wraps have been removed from the engine in question.

• **The fact remains,** however, that newly adopted Pentagon policy, which sets an arbitrary date on when classified jet engine data can be released, (see chart) gives U.S. carriers a full year's edge over foreign airlines in access to performance information as well in eligibility for delivery of any classified engine.

In the case of the J57 engine, which

How Pentagon Releases Jet Engine Data

New Pentagon policy of July 22 (Directive 5230.10) sets this release schedule for data on turbojet, turboprop and turbofan engines for commercial operation. Directive provides that changes in the international situation may either accelerate or retard release of data on a particular engine.

Type of Release	To Cleared U.S. Mfgrs.	To Cleared U.S. Airlines	U.S. Airline Operation	Foreign Airlines	Foreign Engine & Airplane Mfrs.
Prelim. Performance & Installation Data	After 50-hr. FRT	After 150-hr. ET	1 yr. after 150-hr. ET	1 yr. after 150-hr. ET	1 yr. after 150-hr. ET
Complete Performance & Installation Data	After 50-hr. FRT	1 yr. after 150-hr. ET	3 yrs. after 150-hr. ET	3 yrs. after 150-hr. ET	3 yrs. after 150-hr. ET
Delivery for Prototype Aircraft (Opn. and Maint. Data Only)	After 150-hr. ET	1 yr. after 150-hr. ET	2 yrs. after 150-hr. ET	3 yrs. after 150-hr. ET	3 yrs. after 150-hr. ET
Delivery for Production Aircraft & To Airlines	2 yrs. after 150-hr. ET	2 yrs. after 150-hr. ET	3 yrs. after 150-hr. ET	4 yrs. after 150-hr. ET	4 yrs. after 150-hr. ET
Production & Manufacturing Drawings	.....	.....	.....	.....	4 yrs. after 150-hr. ET

Notes: 50-hr. FRT—50-hour preliminary flight test rating. 150-hr. ET—Service approval of 150 hr. endurance test portion of engine qualification test.

received service approval of its 150-hour endurance test in July 1953, the magic date for release of data to foreign airlines comes in July 1956 and delivery of J57s to these carriers can start in July 1957. Since both dates precede any possible delivery of jet planes to either U.S. or foreign airlines, any advantage to U.S. operators by the one-year edge in Pentagon timing is obviously nullified.

• **Big question, however,** is whether this will continue to be true of future engine developments. Since most foreign carriers now involved in the purchase of U.S. transports are similarly associated with the U.S. in mutual defense activities, there appears to be equal question whether the penalty imposed on foreign airlines is not one borne of U.S. airline political pressures rather than of military necessity.

Last question to be answered is: Does the policy penalize U.S. engine producers in their negotiations with foreign operators? It has long been accepted that Pentagon restrictions on U.S. jet engine information have been an obstacle for manufacturers competing with British designs, and the arbitrary penalty imposed by the new policy might well mean the difference between selection of U.S. or British designs on aircraft of the future. • • •

CAB Resumes Nonsked Hearings Next Month

Civil Aeronautics Board will resume hearings October 5 in the Large Irregular Air Carrier Investigation which already has produced a record 30,000-page hearing transcript.

New hearings will be on the qualifications of 30 of the 60 nonscheduled airline applicants who did not previously get an opportunity to testify as to fitness, ability, etc. Examiners Ralph L. Wiser and Richard A. Walsh have tentatively scheduled the new hearings for Washington, Los Angeles, and Seattle.

In addition, the other 30 applicants who were heard on individual qualifications at previous sessions, will get a further opportunity to bring their cases up to date, either through supplemental briefs or possibly on the witness stand.

Meanwhile, the Board is expected to issue its decision soon on the policy phase of the case in which the nonscheduled industry's role for the next five years, at least, will be explained. Purpose of the new hearings is to determine which of the 60 applicants will be authorized to fill the spot outlined in the policy decision.

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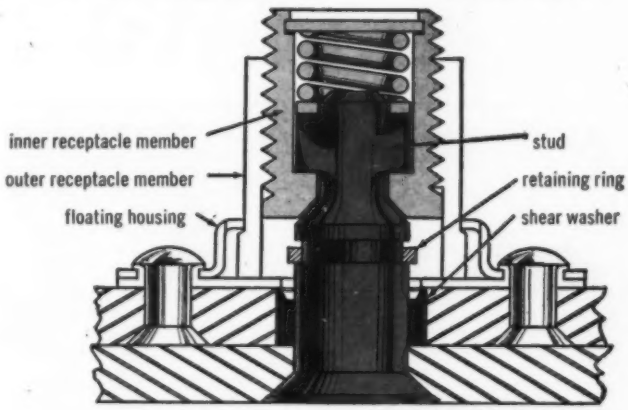

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Convair 440 Moves into Spotlight

With the sale of 11 Convair 440 Metropolitans to one of the world's most fastidious customers, Scandinavian Airlines System, General Dynamics Corp. has once again focussed the attention of transport aircraft purchasers on the Convair-Liner.

A year ago, with Viscount sales at their peak, many high airline officials were predicting that the Convair Division's commercial department had reached the end of the line and that, if production of the twin-engine transport continued, it would be purely for military customers.

Recent events have indicated that not only is the Convair-Liner far from being dead but that the aircraft may not have reached the half-way point in its commercial career. The Convair 440 is but a small milestone in the program mapped out for the development of the basic airframe which first flew in March 1947. Since then 35 airlines have bought Convair-Liners, while more than 500 airplanes based on the Models 240 and 340 have been bought by the U.S. Air Force and Navy.

While the Convair 440 is little more than an improved 340—it was, in fact, until recently known as the 340B—future models of the Convair-Liner will be very different, even though the basic airframe will be retained. Among the commercial versions of the Convair-Liner in the works are:

• **The Convair 540,** a commercial version of the turboprop-powered YC-131C. Two YC-131Cs equipped with Allison YT56s have accumulated nearly 1,500 hours since they were placed in operation by MATS on January 20. Direct aircraft maintenance man-hour costs per flying hour have decreased to 11.8 hours, while direct engine maintenance man-hour cost is now at three hours even though the planes and engines are still in the early experimental stage.

• **A version** of the Convair-Liner with two wingtip-mounted turbojets to give improved take-off, climb and speed. Convair is hopeful of obtaining a USAF contract to convert two T-29 versions of the 240 into this configuration. The auxiliary jets could be either Fairchild J44s or Continental J69s.

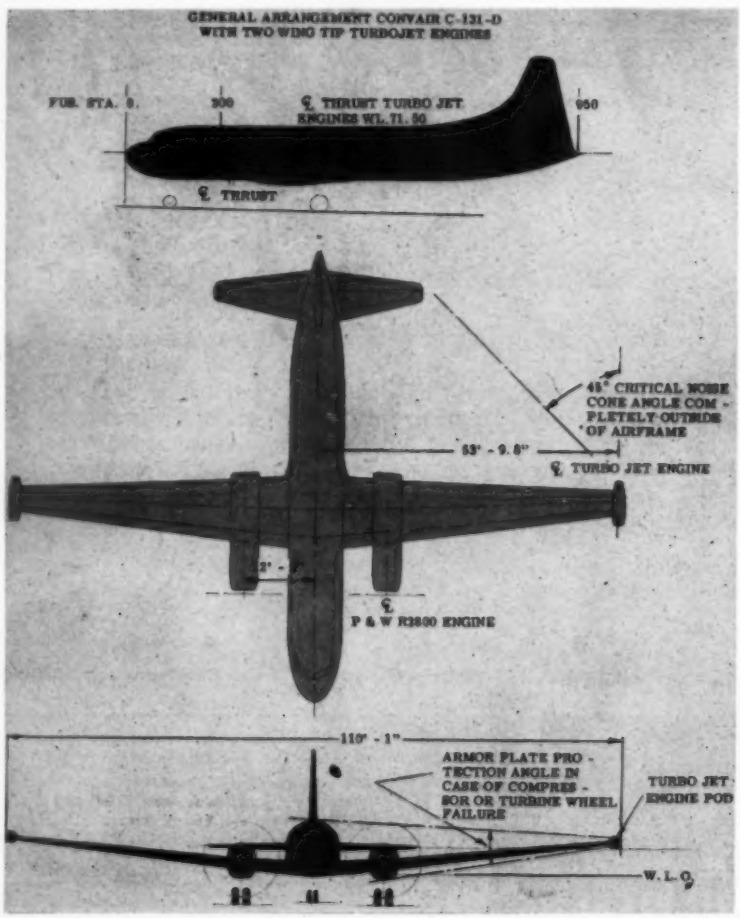
Convair estimates that use of these engines would boost the commercial 340s speed by 40 mph to nearly 330 mph. Runway length for take-off at 47,000 lbs. gross weight would be cut from 4,650 ft. to 4,000 feet with the J44 or 4,050 feet with the J69. The penalty would be a reduction in range: instead of 1,850 miles it would be only 790 miles with the J44 or 910 miles with the J69.

Both the 340 with jet-assist and the 440 are chiefly aimed at customers with a requirement for a fast aircraft for short-haul routes. Many operators, it is felt, require a plane to match or better the Viscount's speed but one that would improve on the British plane's rather poor economics on very short hauls. Convair claims that the 440 with 44 seats and operating with a passenger load factor of 65% breaks even on a route sector of 135 miles. With 52 seats it breaks even on a route sector of only 100 miles (100% indirect costs are assumed in these computations). Direct operating cost is estimated at 1.79 cents for an average trip length of 165 miles.

• **It was clearly** these characteristics that persuaded SAS to order the 440 as a replacement for its Saab Scandias on intra-Scandinavia routes. The average distance of these routes is about 250 miles. Since the aircraft will cruise at around 280 mph, SAS estimates that at least one hour will be cut from most of the airline's routes within and between Denmark, Norway and Sweden. Other customers for the 440 include Aero O/Y, Finnish flag carrier (one aircraft) and REAL-Aerovias Brasil (two); moreover, the two 340Bs ordered earlier this year by REAL will be delivered in 440 configuration as will the three 340Bs ordered by Continental Air Lines. Customers reported about to buy the 440 include SABENA Belgian World Airlines and Swissair, both 240 operators.

The 440, with 52 seats, has a basic price tag of $708,675. This money buys what Convair says is the aircraft with "the quietest passenger cabin of any twin-engine commercial aircraft." This is achieved by fitting a redesigned engine exhaust silencer with a single rectangular opening at the end of each nacelle; special inner window assemblies installed on the first eight rows of seats; and additional soundproofing. The aircraft will be fitted with a "radar nose."

• **Maximum range** of the 440 with no wind and a 1,500-lb. fuel reserve,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NEXT DEVELOPMENT OF CONVAIR 440 may involve addition of wingtip-mounted auxiliary jets which would make it look like illustration above. USAF is negotiating to have two of its military Convair-Liners modified this way.

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under cruise conditions at 20,000 feet altitude and a maximum take-off weight of 49,100 lbs. (44 passengers, baggage and 1,313 gallons of fuel) will be 1,310 miles as against 1,150 miles for the 340. The 52-passenger version will have a range of almost 1,000 miles under the same conditions. Take-off runway length is 4,930 ft., while the landing runway length at 46,500 lbs. is 3,980 feet. All these figures are with the P&W R-2800 CB17 engine (with the CB16, maximum take-off weight is 48,000 lbs., while range and runway lengths are also smaller).

Although the 440 is being offered in both 52- and 44-seat versions, Convair officials expect that the 44-passenger version will be customary for domestic use. SAS and REAL, however, are taking the 52-seat model in which two extra rows of seats are installed in the forward cabin area. • • •

Changes in Convair-Liner

Wing-pod installation of Fairchild J44 or Continental J69 on Convair-Liner requires:

1. Reinforced front and rear spars inboard to Sta. 28.
2. Heavier attachment fittings at end of front and rear spars.
3. New wing tip for (a) engine attachment, (b) heat anti-ice air exhaust, (c) plumbing installations.
4. New leading edge for heat anti-ice air exhaust outlet on tip.
5. Revised ailerons to clear jet pod.
6. Revised outboard aileron hinge fitting.
7. Revised outboard end of trailing edge to accommodate new tip.

ODM Halts Tax Writeoff Program

The accelerated tax amortization program for the air transport industry ground to a halt last month as a result of a suspension order by Arthur S. Flemming, Director of the Office of Defense Mobilization, and there was considerable doubt when the program would be renewed, if at all.

Secretary of the Treasury George M. Humphrey has criticized the program, urging that it be continued only under what he called "strict limits." Humphrey said "indefinite continuance" of such tax relief measures "involves the very real danger that interests receiving the benefits of it come to rely upon it to the detriment of others who are not so favored."

It may be assumed that Humphrey's views reflect those of President Eisenhower since they were aired in testimony before the Mollohan subcommittee of the House Government Operations Committee.

• **Humphrey estimated** revenue loss for fiscal 1956 as the result of rapid tax writeoff at $880 million. How much of that loss would be the result of writeoff privileges granted the aircraft industry it is difficult to estimate, but it would undoubtedly run into millions.

ODM is reviewing tax writeoffs not only in the aircraft industry, but in 38 industry categories. ODM Director Flemming has already terminated such writeoffs for 18 other industry categories, presumably in line with new Administration policy. An early decision on pending aircraft industry applications was promised.

Prior to the ODM suspension of tax writeoff privileges for the aircraft industry, a total of approximately $501,000,000 in writeoffs had been certified for 13 airlines and one equipment leasing firm. Under the program, these firms may write off 80% of the cost of aircraft purchases over five years instead of the customary seven.

• **In the case** of Trans World Airlines, granted the largest amount for writeoff purposes, this figure was $107,654,000, covering 96 aircraft. Eastern Air Lines received the next largest allowance, $105,727,000, for 102 aircraft. American Airlines was third, with $81,476,000 for 58 aircraft, and United Air Lines fourth, with $56,768,000 for 25 planes.

Applications for tax writeoffs are reviewed by the Defense Air Transportation Administration of the Department of Commerce and recommendations made to ODM.

DATA is known to be in favor of extension of the five-year writeoff allowance for commercial airlines.

The final ODM decision, when issued, is expected to reflect the views of the Secretary of the Treasury, at least in part.

• **Last November,** ODM's original goal of 600 commercial aircraft to be certified for the five-year writeoff was reached. Since then, 426 additional aircraft valued at $500,925,000 have been certified. That figure includes three planes owned by Aviation Equipment Corp., valued at $6,500,000.

In addition, DATA recommended and ODM certified about $11,500,000 worth of ground facilities as entitled to the rapid writeoff (at 60% of their valuation) under ODM's Goal 220 program. Included in this total was $5,500,000 for an Eastern Air Lines hangar and $3,000,000 for TWA.

• **Accelerated amortization** improves the cash position of the airlines and encourages them to buy as many planes as they can profitably use. It also helps them borrow for purchases of new equipment.

Airline officials generally are noncommital when asked their attitude toward the rapid tax writeoff program, but nine lines have pending applications for additional tax writeoff privileges. These include three of the Big Four.

Pending applications (see table) include 266 additional aircraft, valued at $473,213,000.

Summary of Certificates Granted for Accelerated Tax Amortization of Transport Aircraft and Related Spares

Applicant	No. of Aircraft	*Amount Certified (000s)
American Airlines	58	$81,476
Braniff International Airways	26	13,379
Capital Airlines	12	10,990
Delta—C & S Air Lines	47	47,485
Continental Air Lines	10	6,529
Eastern Air Lines	102	105,727
The Flying Tiger Line	7	9,100
National Airlines	24	24,701
Northwest Airlines	6	16,116
Seaboard & Western Airlines	1	3,000
Trans World Airlines	96	107,654
United Air Lines	25	56,768
Western Air Lines	9	11,499
Totals	423	$494,425

* At 80%

Pending Applications

Applicant	No. of Aircraft	(000s)
American Airlines	68	$117,060
Braniff International Airways	9	19,000
Delta-C & S	11	24,750
Capital Airlines	60	64,175
Eastern Air Lines	38	110,022
National Airlines	4	2,400
Northwest Airlines	21	48,752
United Air Lines	43	72,054
Western Air Lines	12	15,000
Totals	266	$473,213

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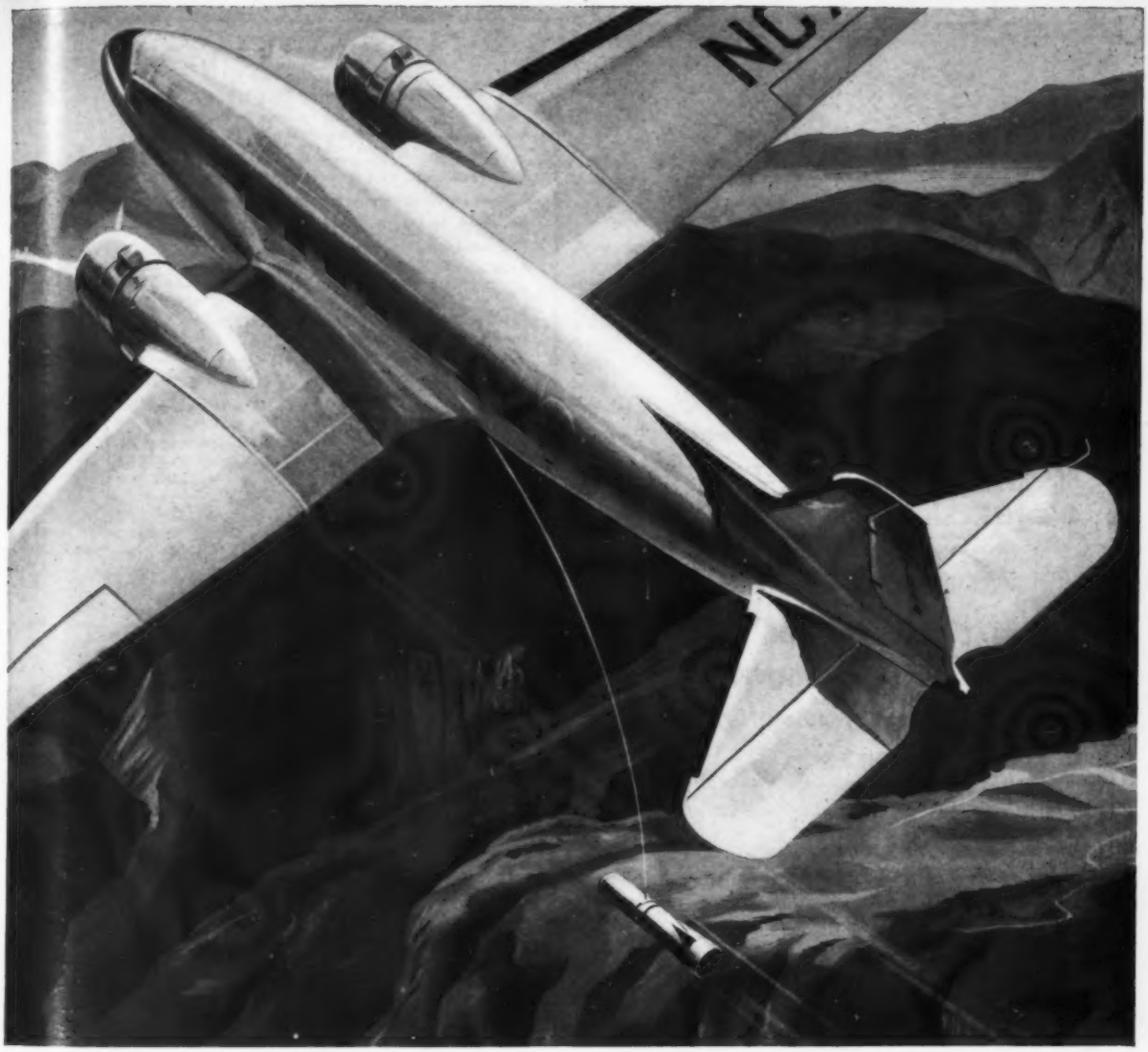

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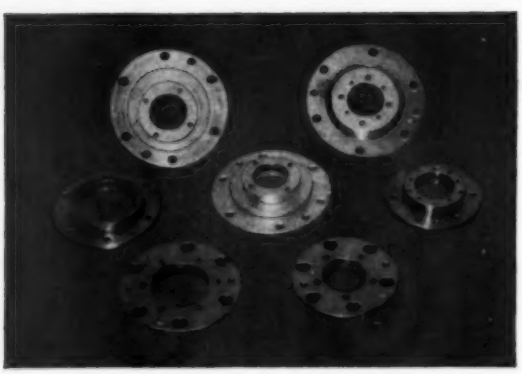

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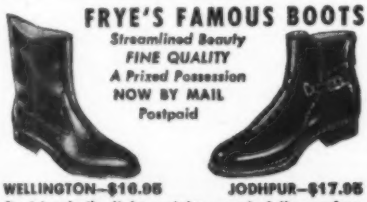

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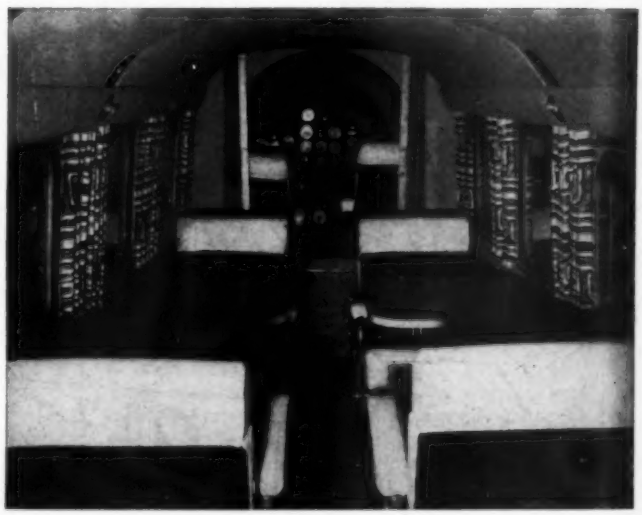

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CAB NEWS

Recent Decisions

Trans-Pacific Airlines authorized to grant free transportation to tour conductors on trips in Hawaii.

Pan American World Airways' Los Angeles-Guatamala route renewed for five years; San Francisco added as co-terminal with Los Angeles.

Ozark Air Lines granted new route extension from Paducah to Louisville via Owensboro, Ky.

North Central Airlines refused permission for "additional use" of O'Hare Airport in serving Chicago on grounds that dual use of O'Hare and Midway Airport would not reduce traffic congestion.

Calendar

Sept. 15—Argument, Denver Service Case (TWA et al.) Wash., D. C. Docket 1841 et al.

Sept. 19—Hearing, Delta-C&S Air Lines International Mail Rate Case. Wash., D. C. Docket 2564.

Sept. 19—Hearing, Texas-California Interchange Case. Tentative. Docket 6597 et al.

Sept. 20—Hearing, Mackey Airlines Renewal Case. Wash., D. C. Docket 6114.

Sept. 22—Prehearing, Intra-Alaska Route Investigation. Wash., D. C. Docket 6093.

Sept. 29—Hearing, Erie-Detroit Service Case. Erie, Pa. Docket 6927 et al.

Oct. 3—Hearing, New York-Nassau Case. Tentative. Docket 7002 et al.

Applications

Lake Central Airlines applied for an exemption to serve Zanesville, O. on its Cincinnati-Youngstown segment.

Hawaiian Air Lines asked authority to grant free transportation to tour conductors on trips in Hawaii.

Northwest Airlines asked approval of $160 round-trip transcontinental coach "basing" fare to be used in constructing through fares for international trips.

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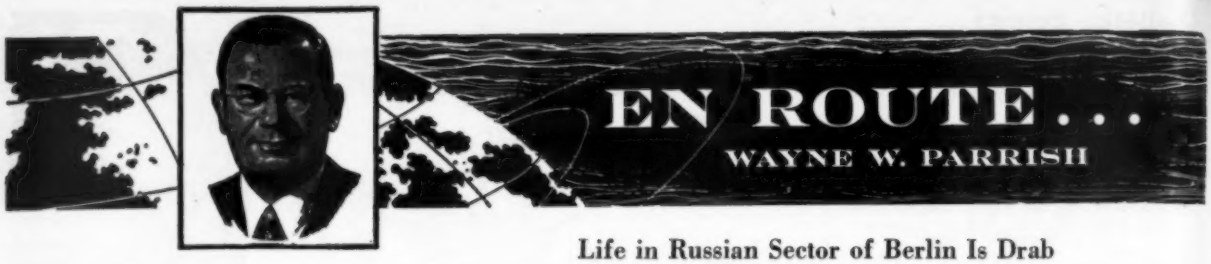

Life in Russian Sector of Berlin Is Drab

The Russian sector of Berlin hasn't changed much in the past ten years. Much of the rubble has been cleared away but rebuilding has been at a minimum. The tram cars and buses are unpainted and the windows are dirty. Streets are being repaired in some places but nobody seems to bother about putting up a red flag or a barrier. There is an atmosphere of decay.

There are still many hulking ruins to be seen. Some of the Communist-run state stores have bright show windows but it is obvious merely from looking at the people that they can't afford the basic necessities of life. Automobile traffic is only a fraction of what it is on the other side of the city in the U.S., British and French sectors. The contrast between east and west is particularly noticeable when you return to the American sector where people are better dressed, traffic is heavy, and the stores loaded with foodstuffs and merchandise of every variety.

But the Russians know how to build monuments. Col. John Galloway, the Army's PIO in Berlin, drove me to the Garden of Remembrance, a colossal memorial set in the heart of an East Berlin park to commemorate the fallen Russian soldiers of the last war. It is impressive, to say the least. At one end is a statue of Mother Russia, facing at the opposite end about two blocks away a colossal statue of a Russian soldier whose sword has just slashed in two a Nazi swastika. In the arms of the soldier is a child. Underneath the statue is a circular hall completely lined with brilliant mosaics.

Between the statues there are two long rows of huge stone monoliths with carvings on the sides telling the story of the Russian battles against the Germans. The park area is kept up immaculately and visitors from everywhere are welcomed by the Russians. All this was new since my last visit to Berlin. What a paradox to find this impressive memorial in the midst of a beaten-down, weather-beaten and ill-kept city.

A Peculiar "Showcase"

The big showcase of the sector is the much-publicized Stalinallee, the monumental apartment house project in which the June 17 revolt of last year got its start. When our car was driving down a wide avenue approaching the six and seven-story apartment houses I was quite impressed. I wondered if all the criticism I had read was unfounded. Looked pretty good to me. Then I found out.

As we approached, it would be like approaching the bottom of a big letter "L" lying on its side. The apartments seemed to have considerable depth. But once we were driving between the two lines of buildings, I could see through the entrance passageways. What a shock. The width of this impressive avenue of buildings is quite narrow and behind them is nothing but vacant lots and rubble and damaged buildings. I will admit that the apartment houses stretch onward quite a distance, over half a mile, but they were not nearly so impressive as the original view from a distance. The project is strictly a showcase taking care of a very small number of people compared to the real housing problem of East Berlin.

As soon as you go through the Brandenberg Gate into the Russian sector and drive down Under den Linden, the most impressive thing in sight is the huge new Russian embassy. Otherwise, the avenue looks about as it did six years ago.

For the first time, thanks to Col. Galloway, I saw the compound in which the families of Russian military personnel are housed. A big area of many blocks is surrounded by a high fence, topped by barbed wire, which runs along the street curbing. Inside the compound are old German houses and small apartment houses, every one in a state of disrepair, or at least they seemed so. They were worse than most East German housing. In the yards were Russian wives and children sunning, reading, talking and playing. They paid no attention to our U.S. Army car as we drove along. (It seemed ironical that the Russians have to keep their own people penned up).

I noted that quite a few apartments and homes were vacant. Some of the window glass was broken and I would estimate that about half the rooms we could see from the street were occupied. Col. Galloway then began checking himself, and concluded that in the past few months (this was June) quite a few Russian families had been moved out. Were they moved back to Russia, or merely to new quarters out in the Russian zone? The exodus could or could not have any significance.

I saw no concentration of Russian soldiers anywhere. But in singles and small groups they were waiting for trams or buses, or shopping, or walking down the street. I was told that the Russians have been making an effort to keep in the background in Berlin, and the same is true of military personnel in the western sectors where I saw very few uniforms.

Americans Popular in Berlin

There is a tremendous building program going on in the western sectors. Wherever funds are being supplied in whole or part by the U.S. there is a sign prominently mentioning the fact. Americans are enormously popular in Berlin and have been ever since the airlift.

Focal point of attention for visitors is the Kurfurstendam, Berlin's Fifth Avenue, located in the British zone. Here are the cafes and the good shops and the movies and most of the hotels. At night the bright lights are very attractive. But in daytime the visitor still gets plenty of reminders of the worst plastering that any city ever got. There are vast areas still leveled, or on which purely temporary structures have been built.

Rolf Julich, who is a booster for Berlin as any native should be, was my guide through a big department store called Ka De We. It's worth a visit. Organized like an American department store, it has just about everything on five floors from restaurants to clothing and kitchenware.

For lunch on the second day Rolf took me to an outdoor restaurant called the Wannsee Terrassen, on the popular Wannsee, one of the big lakes in Berlin. Apart from the fact that the waiter forgot my soup and the service was slow, it was pretty good. Berliners like to dine outdoors in the summer.

Pretty Tame Now

Berlin night life was pretty hot a few years ago; everything went. Wide open. But it is now quite tame and pretty much a waste of time. We went to the St. Pauli nightclub but it's much like any other nightclub and far less interesting than Hamburg. We also dropped into Cherchez la Femme, an intimate nightspot with a little entertainment, which wasn't too bad except for the temperature, which was terrific. Nightclubs don't believe in airing out their places.

Before leaving Berlin I had a chat with Jim Harrison, Pan American's operations manager, who keeps busy with capacity loads. On the BEA flight back to Hamburg I wondered why more American tourists don't know how easy it is to visit Berlin. Only a passport is necessary and the air service is frequent from a half-dozen cities. Only word of caution is to make sure of a hotel room before going. The food is excellent, so are the sights. One brand new hotel which I can recommend is the Kempinsky, on Kurfurstendam, rebuilt on the ruins of the old, and with a dining room that is absolutely first class in every respect.

No one knows what the future holds for the plucky Berliners, but sooner or later the former German capital will be re-united with Western Germany. Until the Russians move out, the economic life of the city remains difficult because of the city's isolation within the Russian zone. In addition, the western sectors of the city must support a sizeable number of refugees who are not permitted to work in competition with the local people. Any way you slice it, Berlin is something to see.

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